ELECTRICAL TIMES

THURSDAY
24 JULY
1952
NINEPENCE

"Successful burial!"

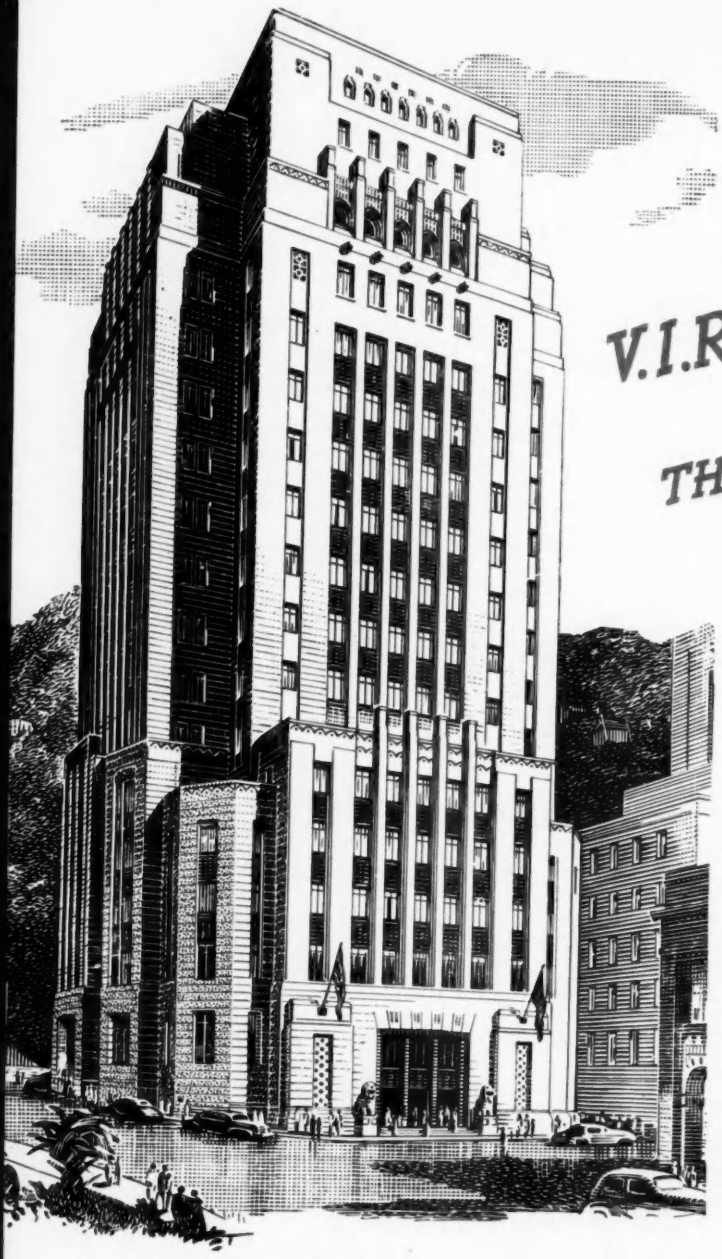
Hundreds of miles of our success lie buried throughout the World . . . High Voltage Cables: developed, manufactured and buried, to do a powerful job ceaselessly, for years and years.

Forty-eight years ago we made a 2,000-volt cable for Gibraltar. In 1915 a 33kV cable was laid in Sydney. In 1944 we buried the first 132kV 3-core I.P. cable in the World, at Burford. All these cables are still in operation.

To-day BICC make cables (including Oil Filled and Impregnated Pressure types) for all working voltages up to 132kV. Meanwhile we are developing cables of even greater capacity to meet the increasing power demands of to-morrow.

B.I. Callender's HIGH VOLTAGE CABLES

BRITISH INSULATED CALLENDER'S CABLES LIMITED
NORFOLK HOUSE, NORFOLK STREET, LONDON, W.C.2



Architects: Messrs. Palmer & Turner

J.&P. V.I.R. CABLES USED THROUGHOUT

BANK OF CHINA HONG KONG

THIS IMPOSING NEW building erected by the Bank of China in Hong Kong is the tallest in the colony. The electrical installation was carried out by The China Engineers Ltd., using J. & P. Cables throughout.

JOHNSON & PHILLIPS LTD.
CHARLTON LONDON S.E.7
The mark that means that "little more" in quality

A very good range of very good FLAMEPROOF MOTORS

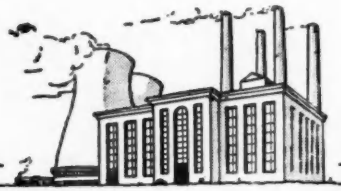
L.S.E. have a comprehensive range of flameproof motors, many of which are available for quite prompt delivery.

Backed by an extensive experience of flameproof motor manufacture, these machines are of advanced mechanical and electrical design. They are made in sizes from about ½ h.p., in normal squirrel-cage, "Trislot" high torque and slip-ring types.

LAURENCE, SCOTT & ELECTROMOTORS LTD.

Norwich, Manchester, London and Branches.

A



Phosphor Bronze

FOR THE ELECTRICAL INDUSTRY

SHEET, STRIP, ROD, WIRE, TUBE, CHILL CAST BARS

in a range of alloys containing 3% — 12% Tin, for specific purposes; to private specifications and to British Standard Specifications

Charles Clifford & Son Ltd

DOG POOL MILLS, BIRMINGHAM 30 *and*
FAZELEY ST. MILLS, BIRMINGHAM 5
Offices: London, Glasgow, Manchester & Dublin

M-W.7

DECO CABLE REELING DRUMS

for all moving structures

DECO Electrical Products include

Contact Collector Columns, Limit Switches, Overhead Collector Equipment, Winch Limiting Mechanisms for Skip Hoists, Cranes and Mechanical Handling Plants, Cable Reeling Drums

DECO ENGINEERING CO. LTD.

West Row, N. Kensington, London, W.10 Ladbroke 3066-7

P307

IT IS A "CRESSALL-PRODUCT"

'CRESSALL' Back-of-Board Sliding Resistance with bevel wheel drive for fine regulation—with Hand-wheel and Dialplate for mounting.

Sliding Resistances

for all purposes

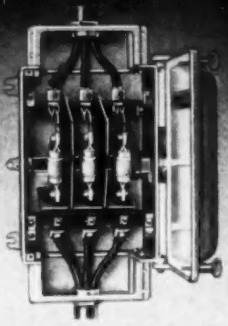
"Cre sall" Sliding Resistances are manufactured in an immense variety of types and sizes to meet every known requirement. Every "Cressall" resistance is of sound design and incorporates the best possible workmanship — yet prices are competitive.

CRESSALL

Registered Trade Name of

THE CRESSALL MANUFACTURING CO., LTD.
TOWER STREET BIRMINGHAM 19
TELEPHONE: ASTON CROSS 2666 (3 lines)
TELEGRAMS: "OHMIC" BIRMINGHAM

You cannot buy better gear



IMPERIAL FUSE SWITCHES.

46 M.V.A. SHORT CIRCUIT "MAKING" TESTS

PREVIOUSLY TESTED AT 33 M.V.A. NOW SUCCESSFULLY TESTED AT 46 M.V.A. 440 VOLTS.

SIZES OF 30, 60, 100, 160, 200, 300 AND 500 AMPERES WERE TESTED AND ALL SWITCHES WERE FIT FOR NORMAL USE AFTER TESTS.

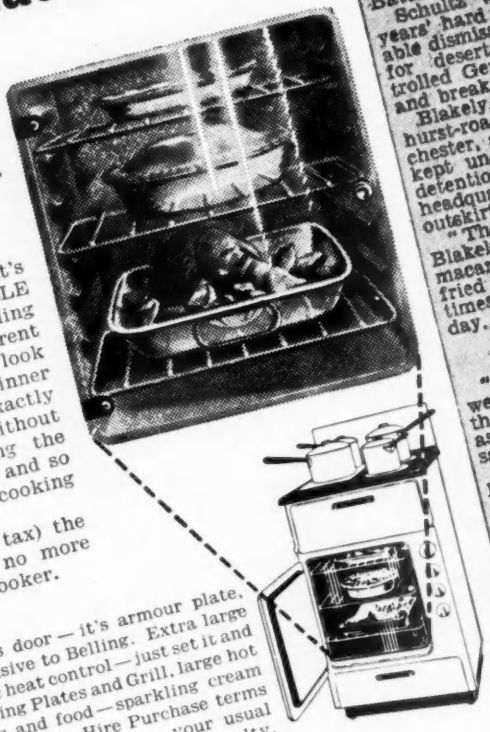
"ENGLISH ELECTRIC" CARTRIDGE FUSE LINKS WERE USED IN THESE FUSE SWITCHES.

FOR DETAILS OF IMPERIAL FUSE SWITCHES SEE PUBLICATION G551.

BILL SWITCHGEAR LTD.
ASTON LANE · PERRY BARR
BIRMINGHAM·20

LONDON A.W.ZELLEY & W.N.PAYNE · MIDLANDS G.H.GARBETT · S.MIDLANDS C.G.BACHELOR · S.WEST C.GEARING · N.WEST H.H.POLLARD · SOUTH W.L.WHITE · SCOTLAND J.D.HARRIS

SEE what's cooking through the glass door



Yes, you really *can* see what's cooking now! It's VISIBLE COOKING that makes Belling Electric Cookers so different and so popular — just look through the full size inner glass door and see exactly what's going on inside without losing heat or spoiling the food — it's all so easy and so economical and makes cooking a real pleasure.

At only £34.12.6 (no tax) the Belling 47AB costs no more than an ordinary cooker.

Full size inner glass door — it's armour plate, steam free and exclusive to Belling. Extra large oven with automatic heat control — just set it and leave it. Three Boiling Plates and Grill, large hot cupboard for plates and food — sparkling cream or white vitreous enamel. Hire Purchase terms available. Immediate delivery from your usual Electrical Shop or Showroom. If any difficulty, please write to Belling & Co., Ltd., Enfield, Middx.

"Belling" visible cooking

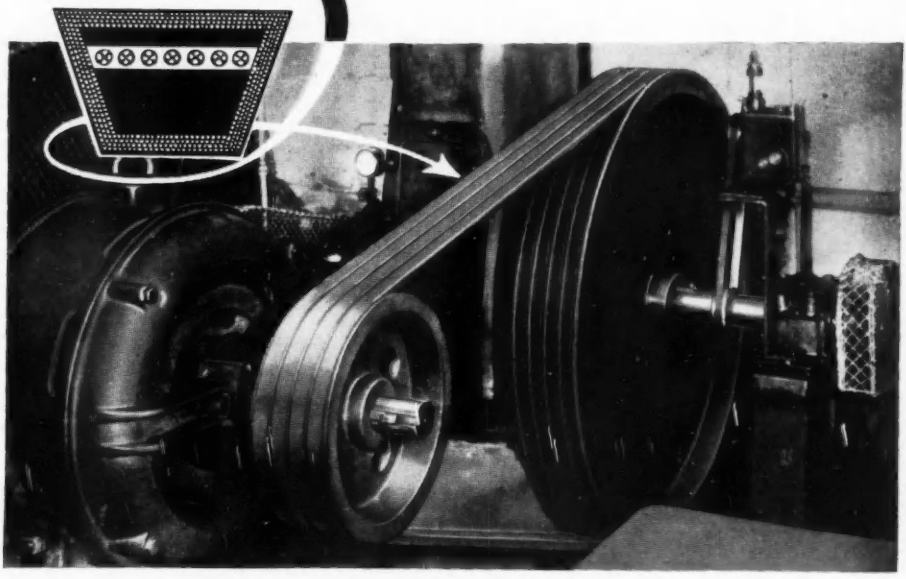
It's no use

trying to say that anything is easy to sell today; it isn't, but some things are easier than others — some cookers for instance. With its glass door and other exclusive features, the Belling 47AB has never stayed very long in your stock-room. Not only to keep up but to boost your sales (and ours), we are starting another very big advertising campaign in the national and provincial papers. This advertisement will be getting home 70,000,000 times during the next three months. Here's your big chance . . . If you can't supply your customer from stock, let us know and we'll send you one right away.

BELLING & CO. LTD., BRIDGE WORKS, ENFIELD, MIDDLESEX · HOWard 1212

CRC390

Inside information



The reason for the long, smooth, stretch-free service provided by Turners Cord V Belts is hidden inside. A line of endless high-tensile cords takes the direct pull of the drive without stretch and without strain.

TURNERS

Makers also of Rubber and Balata Power Transmission Belting; Conveyor Belting; Endless Whip-cord Belts.

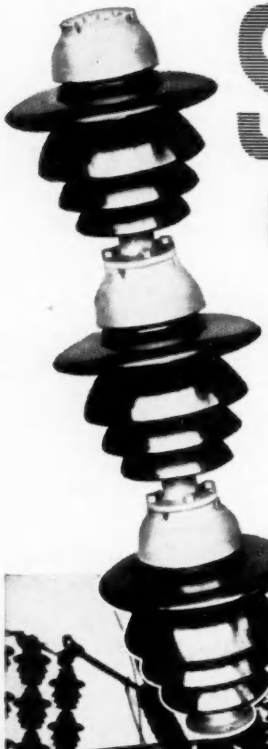
CORD V BELTS

MADE TO B.S.S. 1440/1946

TURNER BROTHERS ASBESTOS CO. LTD., ROCHDALE, ENGLAND

A MEMBER OF THE TURNER & NEWALL ORGANISATION

V.24

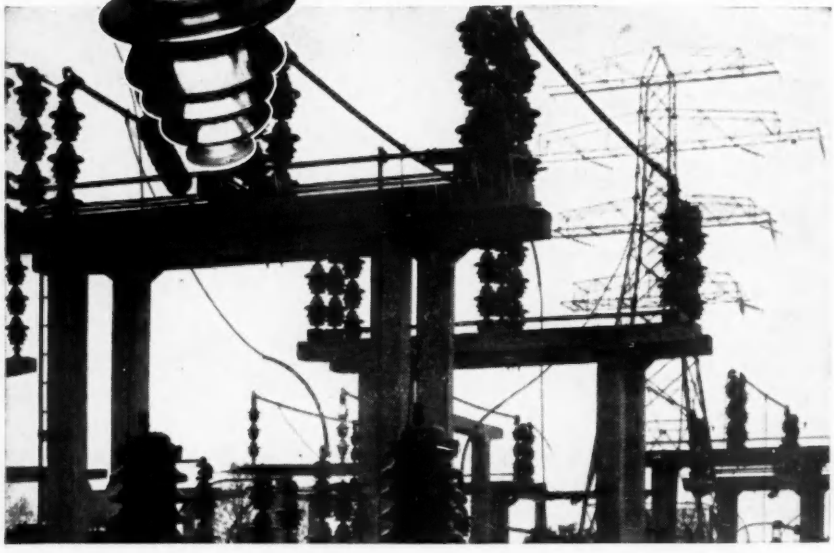


S.P.P.

INSULATORS IN SERVICE

Post Insulators in Northern Ireland

(Photograph reproduced by courtesy of the main contractors, Messrs. A. Reyrolle & Co., Limited.)



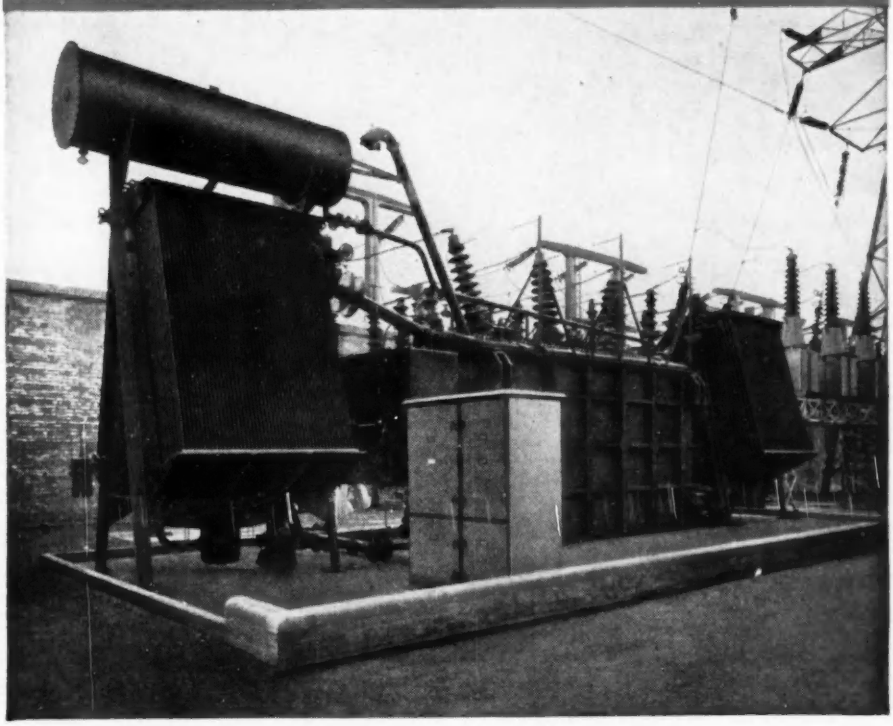
The 110 kV. sub-station at Drumnakelly is one of the many similar stations on the Ballylumford Scheme, Northern Ireland, equipped with S.P.P. posts of 3 units P.643.

STEATITE & PORCELAIN PRODUCTS LTD.

Stourport-on-Severn, Worcestershire. Telephone: Stourport 111. Telegrams: Steatain, Stourport.

SP 83

TRANSFORMERS



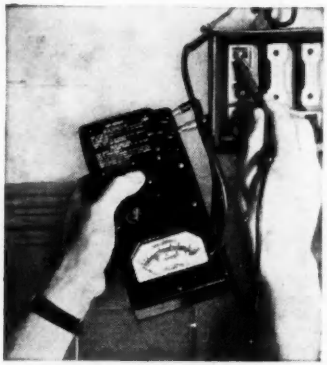
A 45,000 kVA, 132/33 kV transformer, fitted with 132 kV on-load tap changer, at the Newport outdoor substation of the B.E.A.

by G.E.C.

THE GENERAL ELECTRIC CO. LTD., MAGNET HOUSE, KINGSWAY, LONDON, W.C.2

Insulation plus continuity ...

WITH ONE INSTRUMENT



The Everett Edgcumbe Hum-Metrohm Insulation Tester is an instrument with three positive advantages.

1. One-hand operation, leaving the other free to manipulate the connections.
2. 500-volt insulation and earth circuit conductivity tests combined in a single instrument.
3. Practically ripple-free testing current facilitates insulation measurements in presence of capacity.

Both regular and occasional users of insulation testing sets will find these three advantages of real value.

Full details gladly sent on request.

CATALOGUE SHEET No 242E

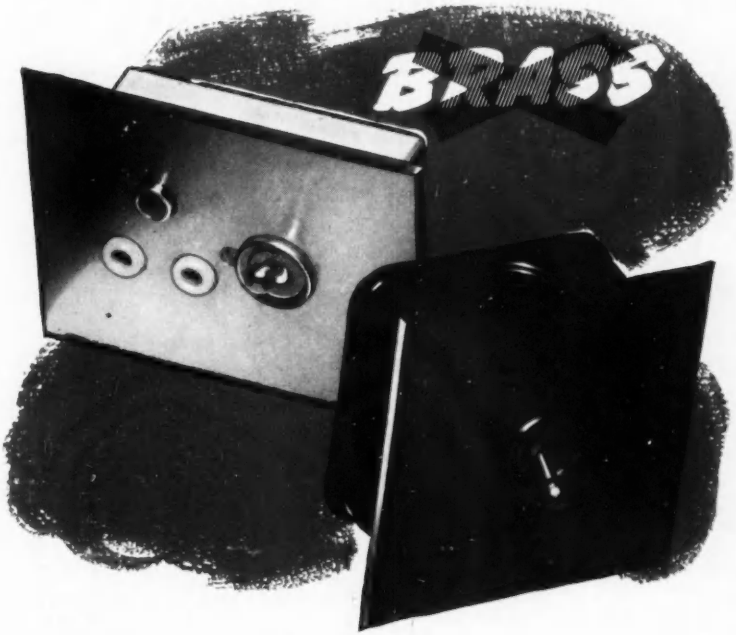
the Hum Metrohm

Makers of Electrical Instruments for Indicating, Recording and Controlling; Photometric Apparatus; Process Controls.

EVERETT EDGCUMBE

COLINDALE WORKS, LONDON, N.W.9
Telephone : COLindale 6045

DH8



Alternative METAL PLATES ARE NOW AVAILABLE

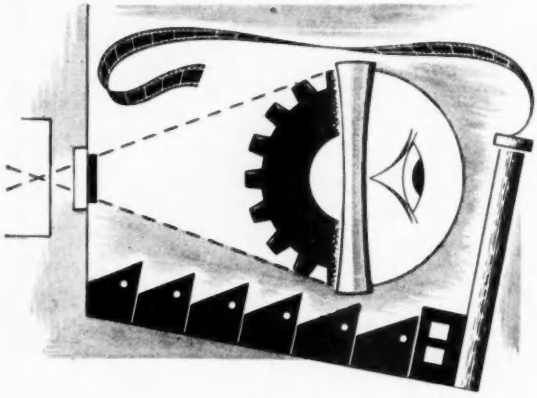
Restrictions upon the use of brass have led us to develop a full range of plain flush plates in aluminium. These substitute plates can be supplied in either "anodised natural" or "anodised B.M.A." finish.

CRABTREE

A name synonymous with Progress in Accessories and Switchgear

"Crabtree" (Registered) *C659/134 Advt. of J. A. Crabtree & Co. Ltd., Walsall, Staffs. England*

visual aids in industry...



Many large industrial organisations are convinced that the projected picture is the most rapid, effective and economical means yet devised for employee training.

As the world's largest manufacturer of visual aids—including projectors suitable for daylight operation—we are able to supply the appropriate equipment for every application.

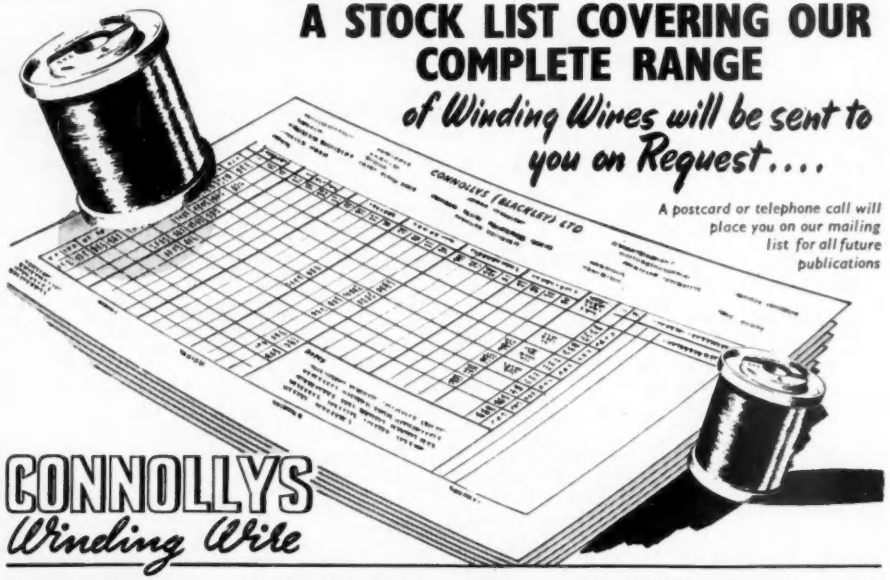
Our advisory service is at your disposal.

Please write for details to Dept: W47

Newton

NEWTON & CO. LTD., 72 Wigmore Street, London, W.1

Associated with Metropolitan-Vickers Electrical Co., Ltd. *A member of the A.E.I. group of companies*



A STOCK LIST COVERING OUR COMPLETE RANGE

of Winding Wires will be sent to you on Request....

A postcard or telephone call will place you on our mailing list for all future publications

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Winding Wire

CONNOLLYS (BLACKLEY) LTD · MANCHESTER · 9

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WARDS for RAILS and SIDINGS

NCB

The layout illustrated shows a tandem turn-out providing a ladder of sidings at the Primrose Hill unit of the National Coal Board, by whose courtesy the photograph is reproduced.

Because we take a pride in our undertakings relative to their size and importance, there is a tendency for us to feature our bigger contracts whenever we choose a photograph to illustrate our work. Nobody would gainsay us this very human privilege. Nevertheless, there are always dozens of smaller jobs in progress all over the country in which we take no less pride—jobs which, relatively small though they be, still carry the unmistakable stamp of planned construction which characterises every Ward-built siding, no matter what its size or complexity.

The Railway Siding Consultants and Contractors

THOS W. WARD LTD

ALBION WORKS · SHEFFIELD

TELEPHONE: 26311 (22 Lines) · TELEGRAMS "FORWARD, SHEFFIELD"

LONDON OFFICE: BRETTENHAM HOUSE · LANCASTER PLACE · STRAND · W.C.2

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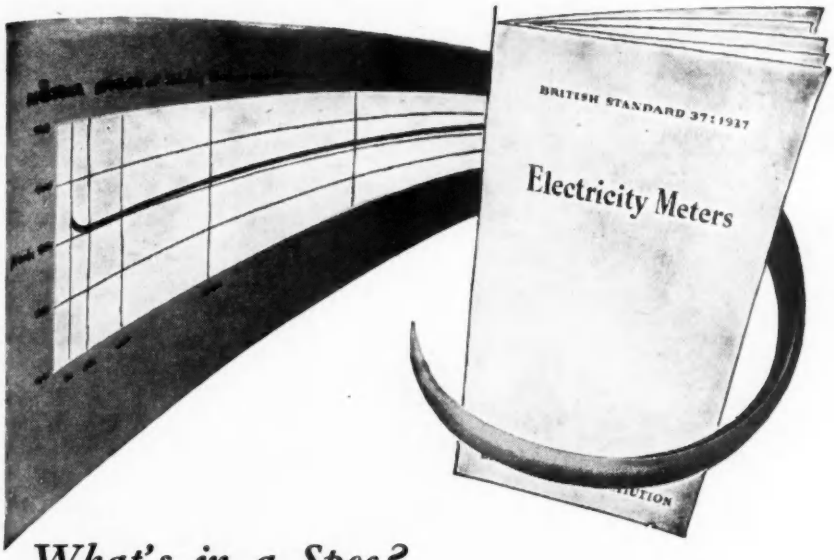


What's in a Spec?

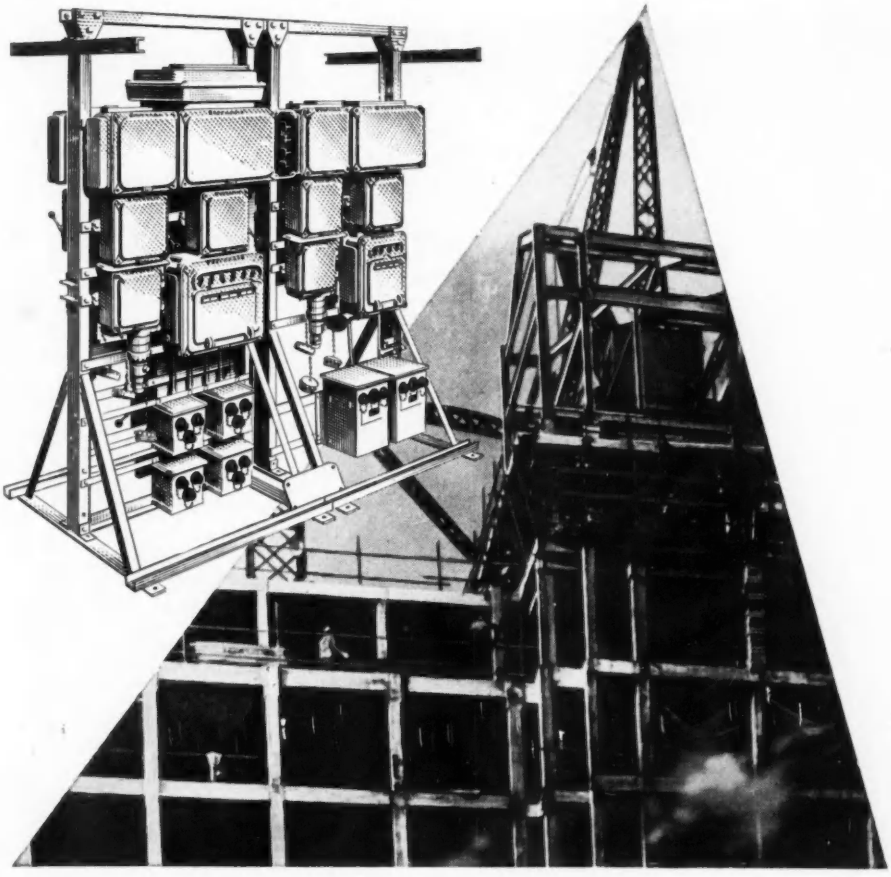
We have the highest respect for standards. The immediate point is, our single phase meters, types ZFB and ZEB, are within the spec; meaning B.S.S. 37, of course.

Repeat orders from all over the World prove that, in practice as well as theory, meters types ZFB and ZEB are all you want them to be, and that

meters are matters for

MEASUREMENT

MEASUREMENT Ltd., Electricity Meter Division, Tameside Works, Dobcross, Nr. Oldham, Lancs. Tel. Delph 291
Hydraulics Division, 119 Union Street, Oldham, Lancashire.
Remote Control Division, 7/17 Fitzalan Street, Kennington, S.E.11
A Company of the Parkinson & Cowan Group



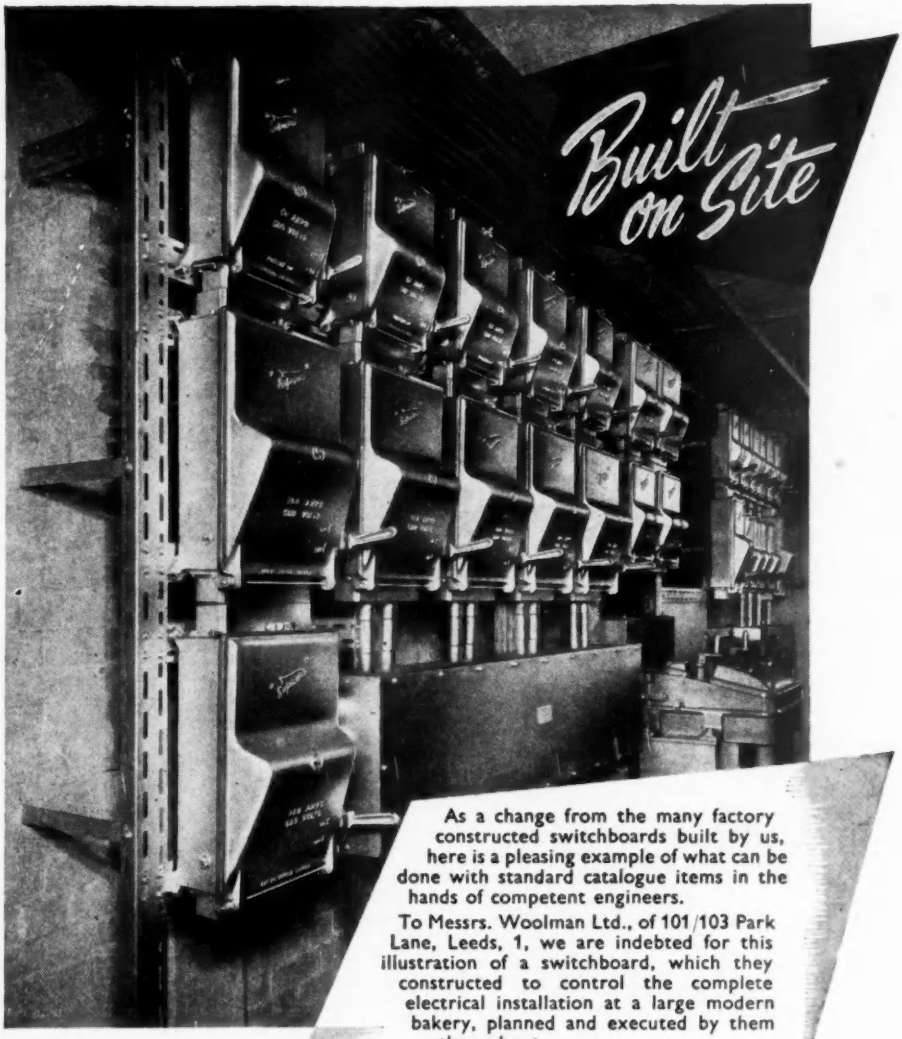
An outstanding feature of **HH** distribution gear is its compactness and adaptability.
For example, by virtue of the unit-construction principle it can provide a safe and transportable means of local power and lighting control during large civil engineering activities. Sectionalised for ease in handling and with its self-supporting framework to which a temporary canopy can be fixed, the arrangement shown was designed for just that job.

Distribution Gear

· · · engineered by Reyrolle

A. Reyrolle & Co. Ltd. · Hebburn · Co. Durham

CRC2D



As a change from the many factory constructed switchboards built by us, here is a pleasing example of what can be done with standard catalogue items in the hands of competent engineers.

To Messrs. Woolman Ltd., of 101/103 Park Lane, Leeds, 1, we are indebted for this illustration of a switchboard, which they constructed to control the complete electrical installation at a large modern bakery, planned and executed by them throughout.

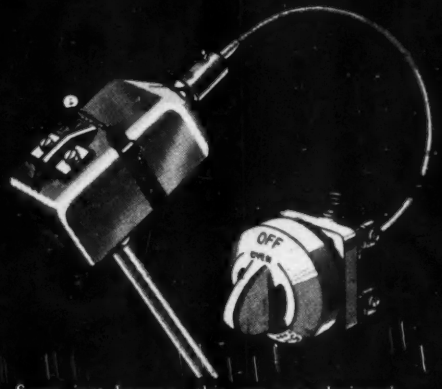
The gear was supplied from the stock of one of our accredited distributors.

SANDERS
WEDNESBURY

WM. SANDERS & CO. (WEDNESBURY) LTD., WEDNESBURY, STAFFS.

The oven thermostat

WITH FLEXIBLE DRIVE



Some just happen; this one was designed . . . . . designed to cut out the snags . . . . designed for minimum maintenance. . . . . designed (note the flexible drive) for easy fitting . . . . designed — and made — by people who know.

SUNVIC

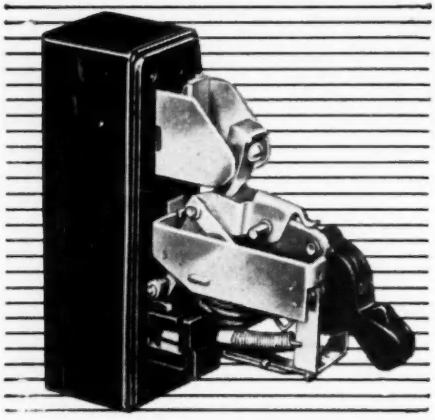
Domestic temperature controls

SUNVIC CONTROLS LTD., SUNVIC HOUSE, ESSEX STREET, STRAND, LONDON, W.C.2
Member of the A.E.I. Group of Companies

TAS/Sc.264

QUANTITY PRODUCTION
BRAY
INSULATOR AND REFRACTORY WARE
OF SMALL AUTOMATICALLY MADE ARTICLES TO FINE TOLERANCES WITHOUT THE COSTLY USE OF GRINDING

GEO. BRAY & CO. LTD. LEEDS 2



Miniature
CIRCUIT BREAKER
TYPE SI2I
ONLY 1½" WIDE x 4⅜" HIGH

For power and lighting circuits
up to 30 amps 250 volts.
Instantaneous short-circuit
and time-lag O/L releases.
Neutral link.
High rupturing capacity.

Tested at an Authorised
Short-Circuit Testing Station

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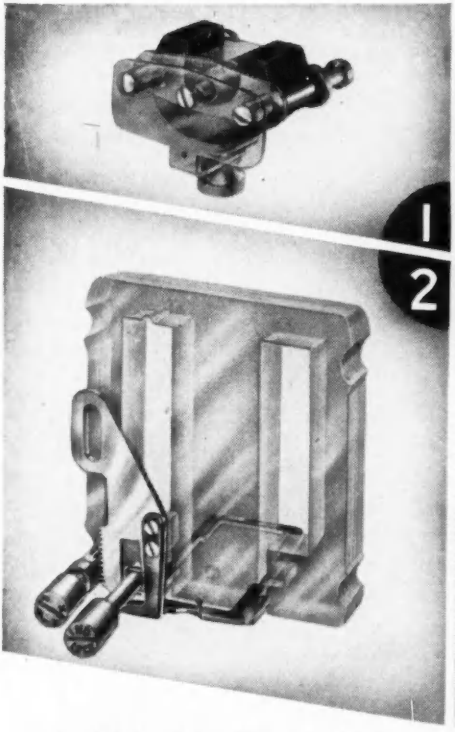
Smet's 529



★ ADJUSTMENTS

1 MAIN LOAD
2 INDUCTIVE LOAD
3 LOW LOAD

1 ★
2 3

Backlash has been eliminated on main load and low load adjustments and reduced to a minimum on the inductive load adjustment.

All adjustments have a large range, are smooth and positive in action and can be locked.

FM96

FERRANTI

FERRANTI LIMITED
Hollinwood · Lancashire
London Office: Kern House, Kingsway, W.C.2

FERRANTI
F M Meter

By courtesy of E. F. Pressey, Esq., F.R.I.C.S., Engineer and Surveyor, Borough of Wokingham.

Eleco Planned Lighting

makes roads safer at night

One picture can convey as much as a hundred words. Look therefore at this reproduction from an un-retouched photograph of the ELECO installation on the Reading-Ascot Road (A.329) at Wokingham, Berkshire. *Observe, too, how planned lighting enhances the beauty of the countryside at night.*

Technical Data

Road width 30 ft. Illumination by ELECO "Golden Ray" 140 watt lanterns, at 150 ft. intervals and 25 ft. above roadway, on Concrete Columns.

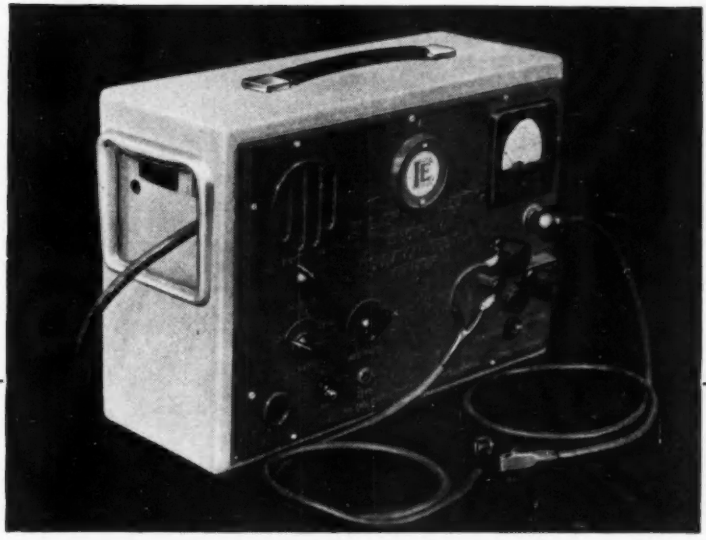
Engineering and Lighting Equipment Co. Ltd.

SPHERE WORKS, ST. ALBANS, HERTS

Telegrams: VOLTARCON, ST. ALBANS *Telephone:* ST. ALBANS 2258/2259

ELECO

For industrial electrical testing



THE 'ENGLISH ELECTRIC' electronic insulation tester provides for the first time 10 kV D.C. in a truly portable equipment having the following outstanding features:

- Non-lethal output adjustable from 500 to 10,000 volts.
- Measurement up to 250,000 megohms.
- High accuracy on comparative tests.
- Rejection of surface leakage current.
- Aural indication of ionisation.

Price : £60. Size : 15" x 10" x 6" Weight : 23 lbs

'ENGLISH ELECTRIC'
electronic insulation tester

THE ENGLISH ELECTRIC COMPANY LTD. QUEENS HOUSE, Kingsway, London, W.C.2
Industrial Electronics Department, Stafford

WORKS : STAFFORD · PRESTON · RUGBY · BRADFORD · LIVERPOOL · ACCRINGTON

EIN. I

L.D.C. 'Fankuld' motors

L.D.C. T.E. Vertical "FANKULD" D.C. Motors 135 H.P. 650/815 r.p.m. at East Greenwich Gas Works.

L.D.C. "FANKULD" T.E. motors are absolutely dust-tight and are particularly suitable for use in dirty, dusty, and fume-laden atmospheres. All machines are specially insulated and impregnated, fitted with special dust-tight terminal boxes and, if required, can be made weatherproof for use in the open.

LANCASHIRE CRYPTO

The Symbol of Power in Industry for over 50 years

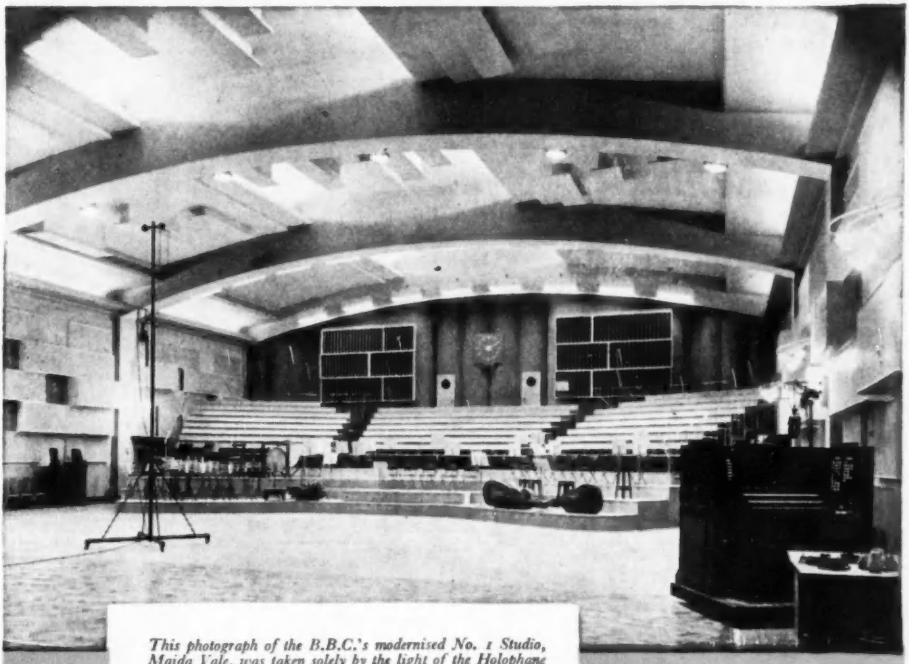
LANCASHIRE DYNAMO & CRYPTO (MFG.) LTD.

TRAFFORD PARK, MANCHESTER 17. ACTON LANE, WILLESDEN, LONDON, N.W.10

London and Export Office: 94, Petty France, London, S.W.1. **Telephone:** WHI. 7211

M/25

The HOLOPHANE SYSTEM OF ILLUMINATION AT THE B.B.C.



This photograph of the B.B.C.'s modernised No. 1 Studio, Maida Vale, was taken solely by the light of the Holophane Units installed.

Electrical engineers with specific lighting problems are invited to consult the Holophane Technical Service Dept.

HOLOPHANE LIMITED

Scientific Illumination Experts

ELVERTON STREET, VINCENT SQUARE, LONDON, S.W.1

Telephone: VICtoria 8062 (4 lines). Telegrams: HOLOPHANE, SOWEST, LONDON

A loud warning before load shedding

Visible and audible warnings are given *before* a predetermined target load is exceeded, thus enabling effective action to be taken to reduce the load to the desired limit.

THE MAIN ADVANTAGES ARE

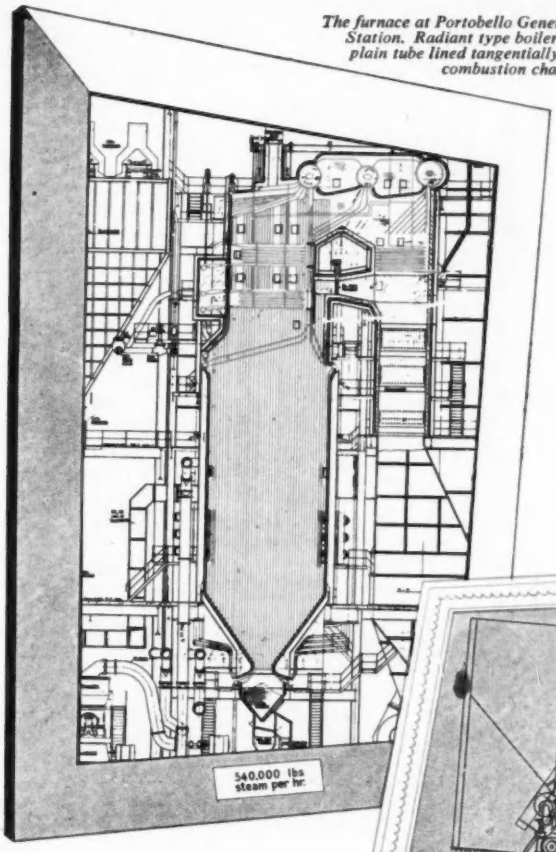
- Immediate indications of the percentage of total load to be shed on warning.
- Warnings are repeated at 5 minute intervals until load is adequately reduced.
- Target load setting easily adjustable and protected against unauthorized interference.
- Duration in minutes of any excess loads is automatically registered.

Chamberlain and Hookham

PEAK LOAD SUPERVISOR

WRITE FOR CATALOGUE SECTION P.L.I.

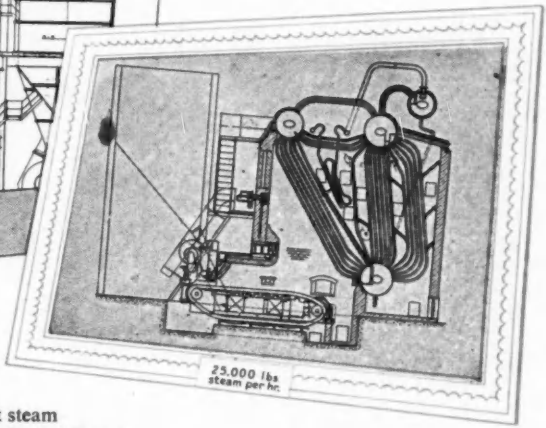
CHAMBERLAIN AND HOOKHAM LTD., BIRMINGHAM



The furnace at Portobello Generating Station. Radiant type boiler, with plain tube lined tangentially-fired combustion chamber.

SG 14

Different picture . . . same experience



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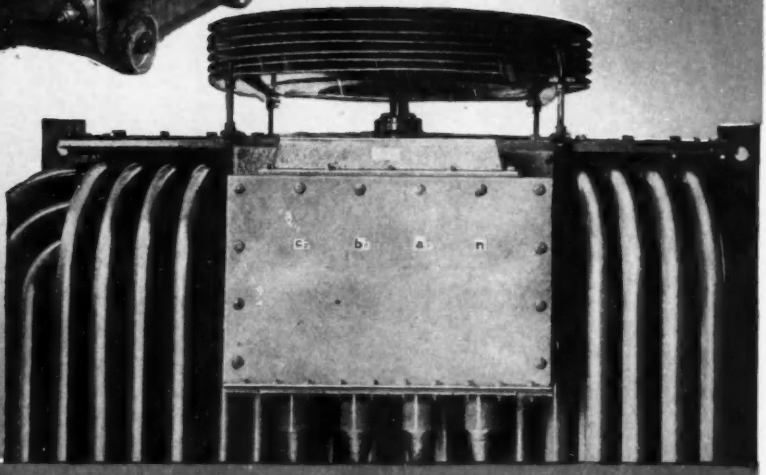

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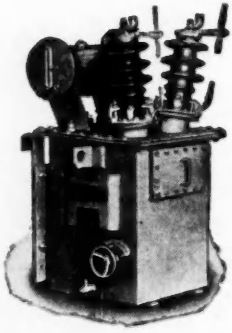

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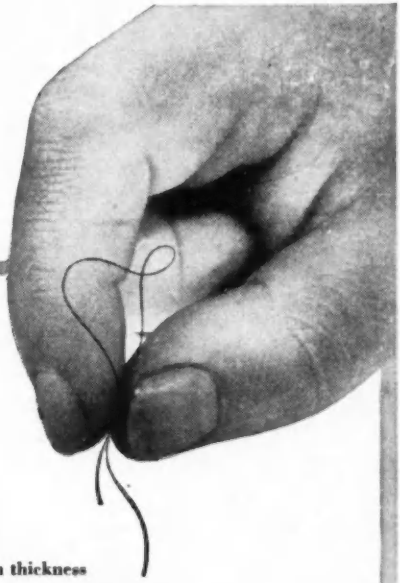

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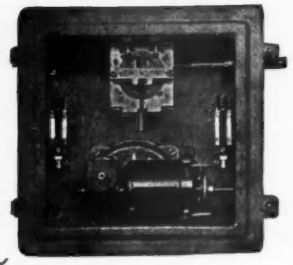

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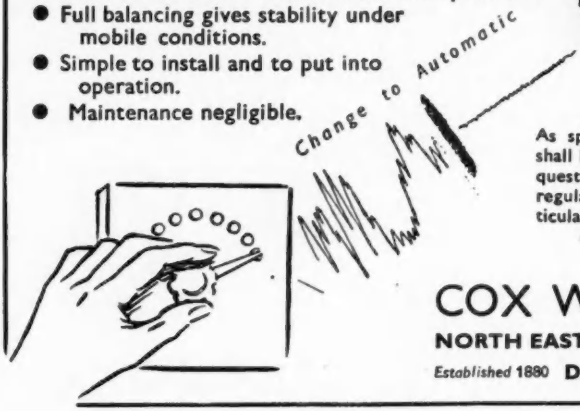

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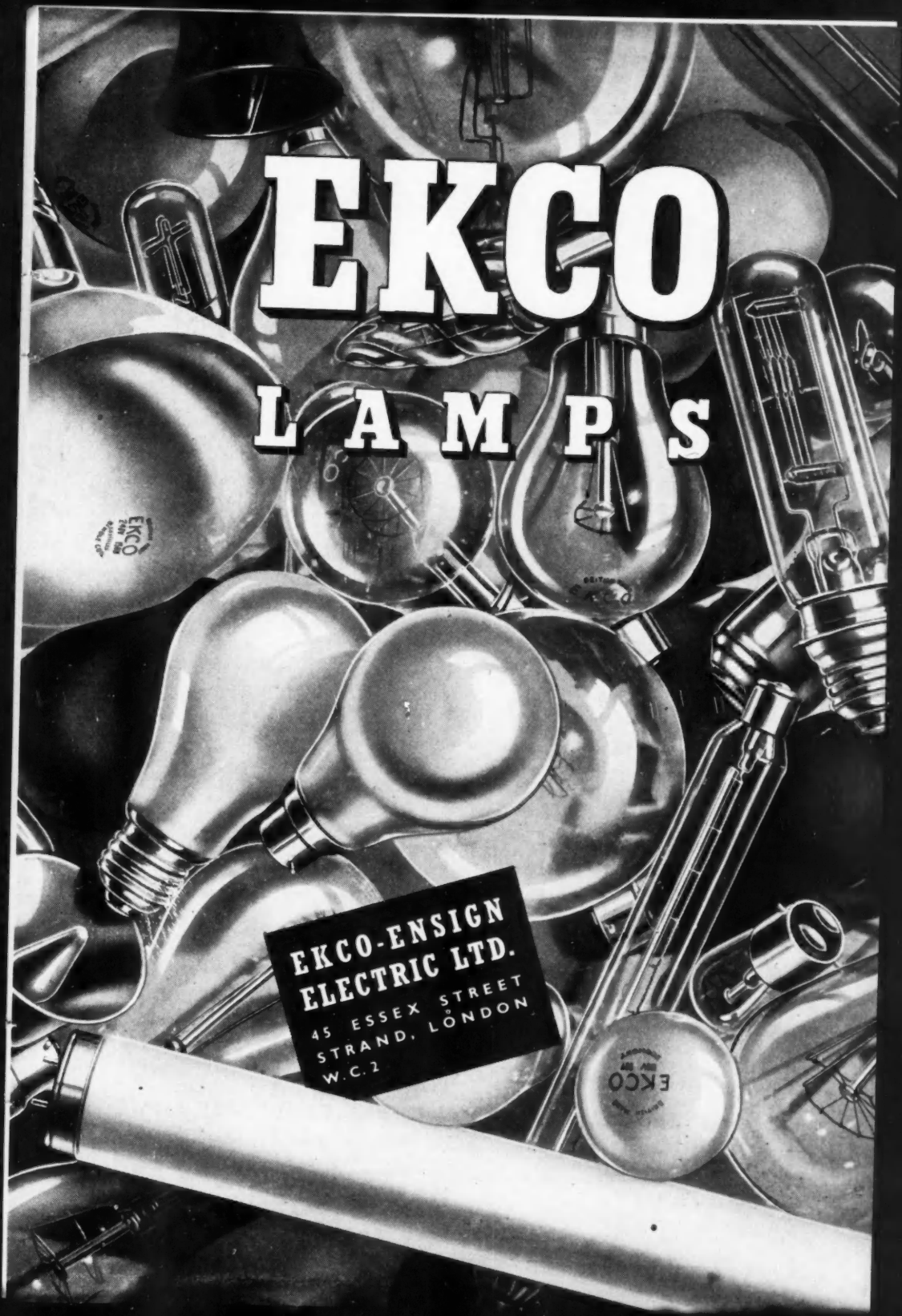
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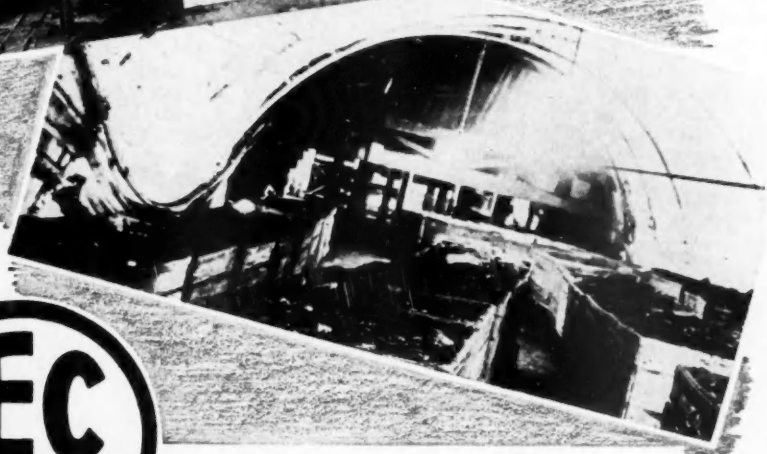

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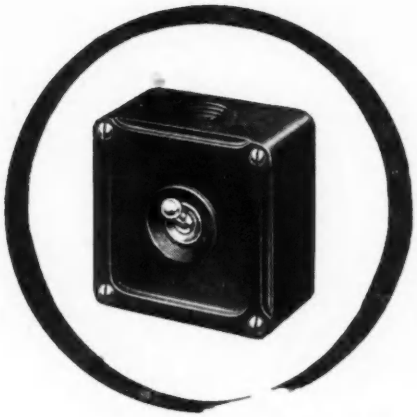

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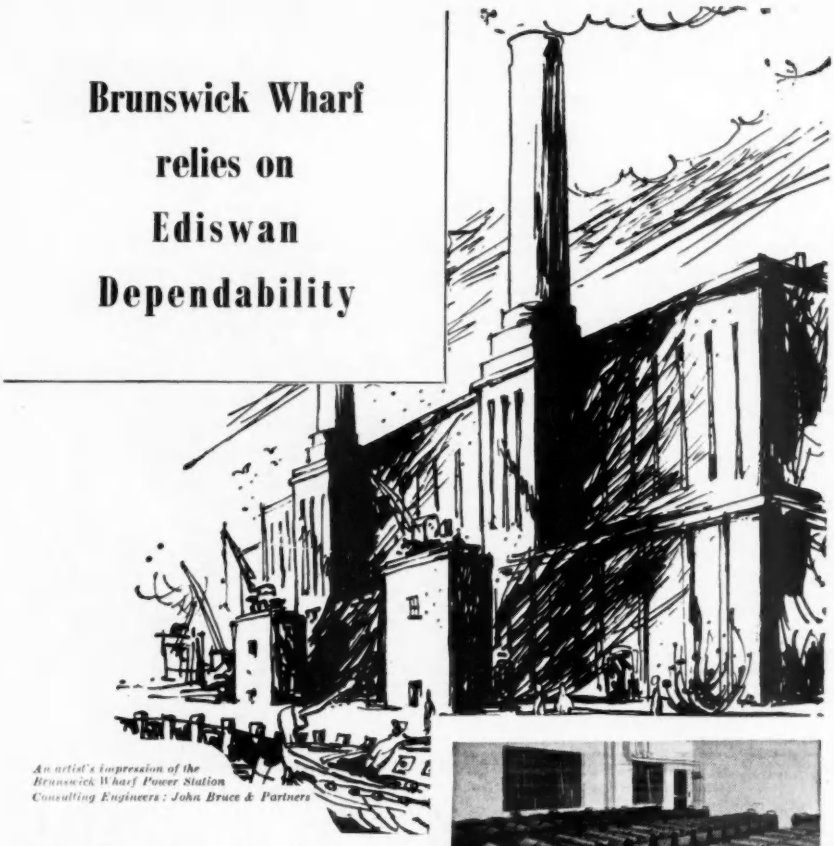

An artist's impression of the Brunswick Wharf Power Station
Consulting Engineers: John Bruce & Partners

The Ediswan battery installations at the Brunswick Wharf Power Station control all switch tripping and closing. The large battery illustrated supplies current for switch-closing, emergency lighting and D.C. motors. Four smaller batteries provide for the operation of air-blast and oil circuit breakers, panel indication lamps and telecommunication equipment.

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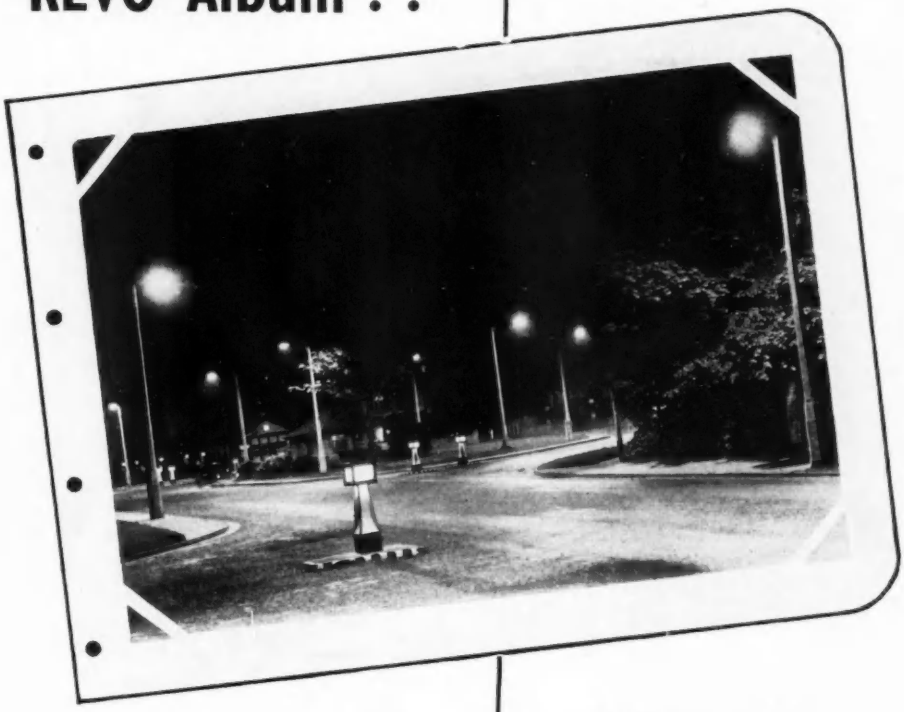
A page from the REVO Album . .



Here is an excellent photograph, typical of many in the Revo album of street lighting views, showing the splendid results obtained from an installation of Revo sodium cut-off fittings mounted on Revo concrete columns at Widnes.

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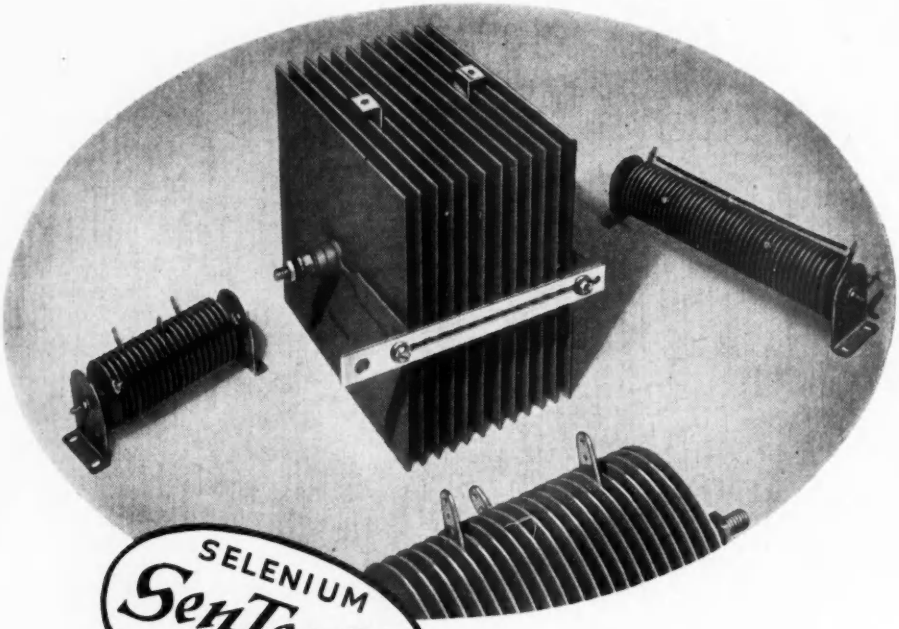

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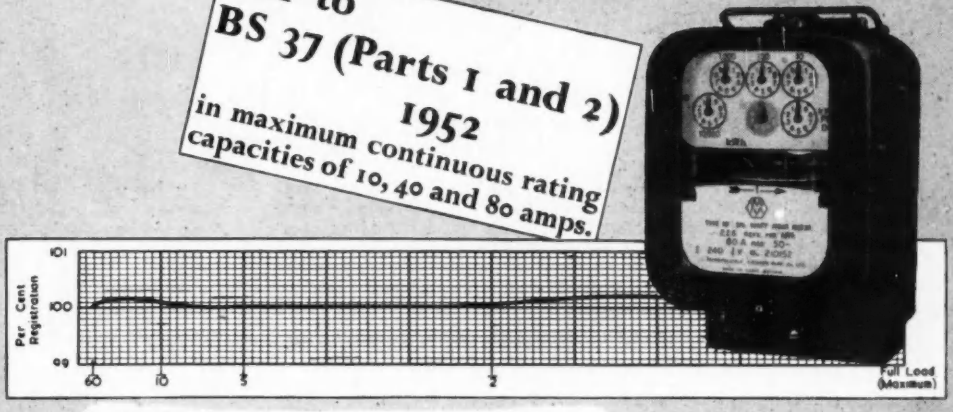

In designing the Type NF meter Metrovick engineers anticipated the requirements of the 1952 specification, consequently the two patterns are fundamentally similar.

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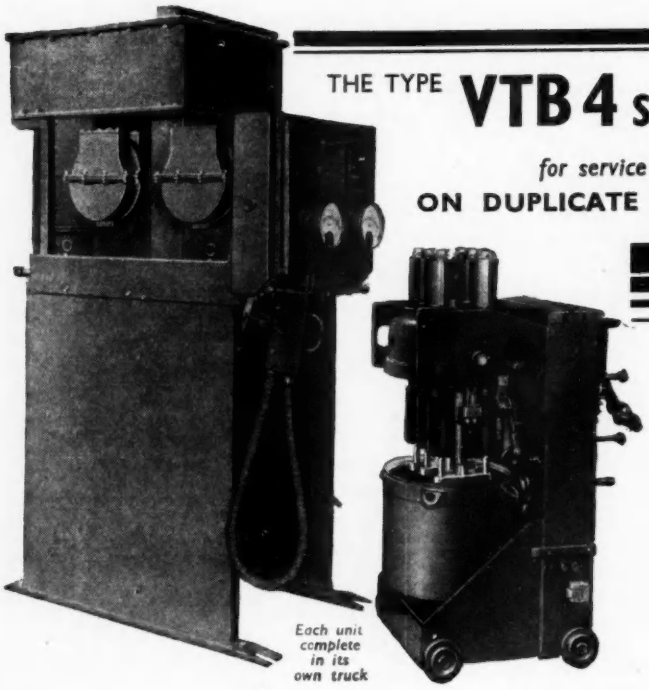

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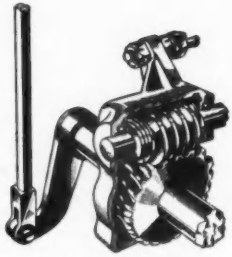

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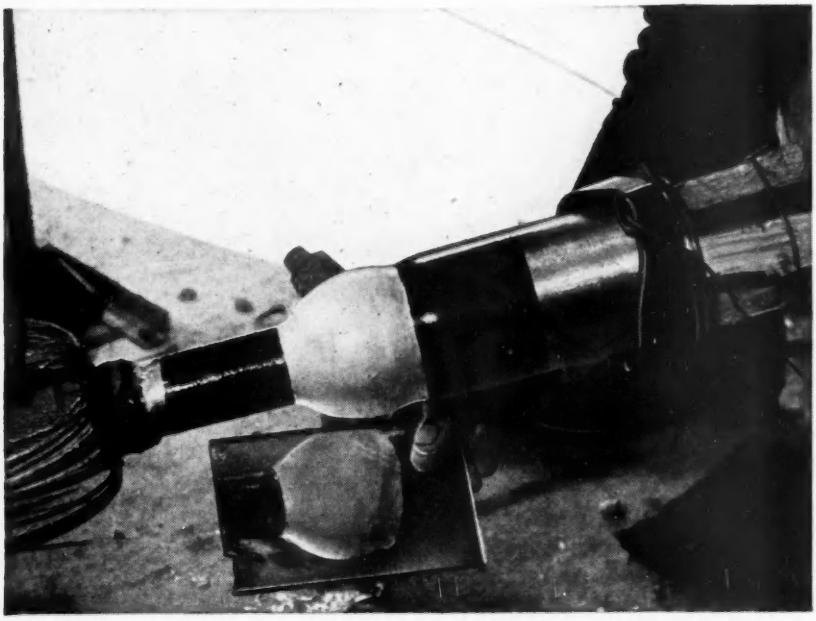

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ELECTRICAL TIMES

Vol. 122 No. 3168 THURSDAY, 24 JULY, 1952

PUBLISHED EVERY THURSDAY

SIXTY-FIRST YEAR OF PUBLICATION

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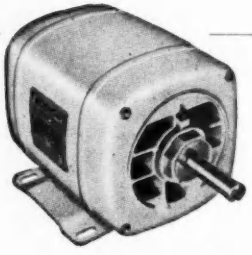

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Editorial

ST. LAWRENCE POWER

THE complimentary luncheon given last week to Mr. Robert Saunders, chairman of the Ontario H.E. Power Commission, served two objects. First, it was a fitting tribute to a genial personality who is a staunch friend of this country. Secondly, it afforded an opportunity for British engineers to hear at first hand some of the major factors of that great project the St. Lawrence Seaway. As Meteor pointed out two weeks ago, although Canada has undertaken on her own to go ahead with the seaway plan, no agreement has yet been reached on the associated power schemes, without which the whole project would be uneconomic. It is reassuring to learn that no serious difficulty is anticipated in obtaining such agreement. Both Ontario and New York need the additional power and, as the final decision is one for the International Joint Commission, it does not call for submission to Government endorsement. The cost of the scheme assignable to power development is estimated at $450m, of which one-half will presumably be subscribed by the U.S. At such a figure the capital cost will be of the order of $170 to $180 per kW, a price which other countries must envy.

A FOOT IN THE DOOR

MANUFACTURERS who have been fighting against well-nigh overwhelming odds to obtain a foothold in the United States market will be heartened by the news, published last week, that Ferranti Electric Inc.—a subsidiary of the British firm—has finally succeeded in obtaining an order from the U.S. Corps of Engineers for nine 33·3 MVA transformers, at a figure of £406,000, against local American competition. The difference in tender price between the lowest American bid and the British figure, some £71,400, might at first sight seem ample justification for buying the equipment from Britain, but it must be remembered that under the "Buy American Act" the American Government is committed to apply a differential in favour of the American manufacturer, and in many cases this has been set as high as 25% of the lowest United States tender. This differential is not, however, rigid, and in fact permission to purchase can be given under the Act if the tender price difference exceeds 5,000 dollars. There is a proviso that all parties concerned must be satisfied and specifications and delivery dates fulfilled. That Messrs. Ferranti were able to obtain the necessary consent from the Secretary of the Army is an indication of a more liberal attitude on the subject of this country's dollar earnings.

STUDIES ON NATIONALISATION

THE flood of legislation concerned with nationalisation has been followed by a spate of books and pamphlets studying the various organisations and the manifold problems to which they have given rise. Of two books which Meteor has recently read, one has quite a domestic flavour since it concerns the supply industry, with the authoritative authorship of Sir Henry Self and Elizabeth Watson. One of the best features of the book is the historical introduction, and from the political viewpoint it is probably the most comprehensive available. Unfortunately, certain more familiar accents are absent and the cross impact between the engineering and political sides could have been studied in more detail. The account of the structure and activities of the supply organisation which forms the major section of the book gives an accurate and detailed picture aimed more to the general public, for whom this work is intended. It does not touch on the basic issues of nationalisation which are raised in the second book, edited by Professor E. A. Robson. This is a symposium

and in consequence has the familiar quality of being good in parts, but as the editor takes ample space to deal with general conclusions, the book gains much thereby. As these two books will be reviewed in due course, and as space on this page is limited, little can be said other than to point out that they are complementary one to the other.

CASES ON I.E.E. RULES

THE I.E.E. Wiring Regulations is not a static body of rules. Apart from their periodic revision, from time to time special cases are submitted to the Institution for interpretation For some years, the ELECTRICAL TIMES has been urging the importance of making available to a wider electrical public such interpretations, particularly those of a more general interest. It was felt that those responsible for such decisions had a moral duty to make known to the industry their views on the problems that arose in practice, and such publication would help to avoid duplication of inquiries. This would especially apply to cases where new installation techniques become available, for the committee has no normal channel of making known its views until the publication of a subsequent edition or by a special supplement. For these reasons the present decision to publish such interpretations should be welcomed by all concerned with installation work, and on a later page in this issue will be found a summary of the more important cases since the issue of the present edition. The Wiring Regulations Committee tend to issue such digests periodically.

GAS GOES OUT

IT does not need an over-long memory to go back to the times when the gas companies were fighting bitterly to retain their existing hold on street lighting against the inevitable encroachment of electricity in this field. Such prestige was attached to street lighting that sales below cost were quite common, one of the most outstanding instances being the adoption of high-pressure gas lighting in London. The advent of electric discharge lamps brought a new phase in lighting technique, with higher standards of illumination with which gas could never economically compete. To those who remember the bitter debates over 25 years ago on the relative merits of the two light sources, the recent statement by the N.W. Gas Consultative Council that gas was not economical for street lighting must come as something of a shock. The Gas Board, it was said, always recommends local authorities to use electricity for street lighting. The wastage from leakages in the streets, which cannot be prevented, is the main reason advanced for this decision. This is a factor which was largely overlooked in those early debates; it should be remembered in the future, for presumably if wastage takes place in supplying street lamps, it also exists in the services to domestic consumers.

POTENTIAL FARM LOAD

ALTHOUGH the use of electricity on farms is rapidly expanding, it is difficult to assess what part electrical energy will ultimately play in the economy of agriculture. Some indication of this may be gathered from the recent report of the National Institute of Agricultural Engineers and the Scottish Machinery Testing Station. One of the pre-eminent subjects considered was that of grain drying, which has become of vital importance owing to the rapidly extending use of combine harvesters. A further example of the employment of electricity on a large scale is found in the use of horizontal fans in orchards to protect the early fruit blossom from frost. Moreover, as agriculture becomes more precise in character, increasing call will be made on electrical measurements to provide the ever-higher standards of accuracy required. Thus, even electric strain gauges are finding application at the present time for experimental work on tractor haulage systems. In many other directions, outlets for the employment of electricity arise, and it is far from possible at the present time to see the ultimate capacity of electrical energy for assisting agriculture.

Meteor

3-Phase Anode Inductors *for Rectifier Circuits*

An analysis of the operation and effect of anode reactances on the d.c. output voltage

By F. T. BENNELL,* A.M.I.E.E.

IT is frequently required to increase the natural impedance drop of a rectifier equipment. A small adjustable increase for rectifier equipments operating in parallel is desirable to enable the load to be properly shared; and a substantial increase, for equipments supplying projection and welding arcs, and for automatic battery chargers, is necessary to obtain stable running. The requirement is not primarily an increased voltage drop but an increased slope of the regulation curve over the working current range.

To avoid losses the additional impedance required in the rectifier circuit takes the form of reactance, and it is usually put on the secondary side of the transformer so that it will not affect auxiliary secondary windings. It therefore usually takes the form of an anode inductor. Only the d.c. voltage drop due to anode reactance will be considered.

The following has been written with particular reference to 3-phase inductors, but the general principles are applicable also to single, 6- and 12-phase circuits. Six- and 12-phase circuits usually comprise two or four 3-phase anode groups linked together by interphase transformers, and each group may be considered as an individual 3-phase circuit with its own 3-phase anode inductor. Reference to single- and true 6-phase circuits will be made where points of interest arise affecting them.

The 3-phase anode inductor usually takes the form of a 3-limbed core with an adjustable gap between the limbs and the upper yoke, and with a winding on each limb.

ANODE REACTANCE AND D.C. REGULATION CURVES

The simplest case to consider is where there is assumed to be infinite inductance in the d.c. circuit, so that the d.c. current is perfectly steady. This has previously been dealt with on the basis of the integration of waveforms and the use of the angle of overlap. The relationship between the anode reactance and resultant d.c. voltage drop resolves into the simple equation $e_r = I_d X p/2\pi$, where e_r is the d.c. voltage drop due to anode reactance, I_d is the d.c. current in amps., X is the commutating reactance per anode in ohms, and p is the number of rectifier phases. This relationship depends solely on a current change of I_d in each anode as it takes over the direct current and again as it relinquishes it, and within limits is independent of the rate of change (waveform) and the total time taken by the change (angle of overlap).

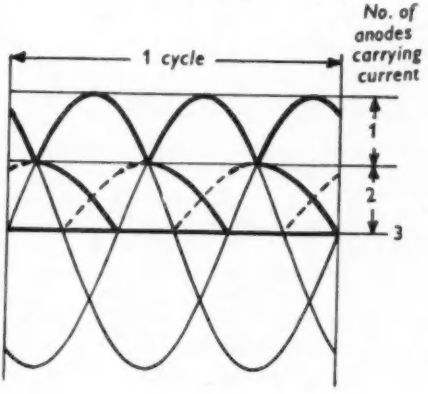
As this article is concerned essentially with average d.c. current and voltage values, the integration of irrelevant waveforms has been avoided and the basic relationships obtained by direct means. The correct application of these relationships to inductor design is thereby clarified.

There are three possible conditions of instantaneous current-sharing, as illustrated in Fig. 1.

(i) One anode carrying the d.c. current. The current has the full d.c. value and the instantaneous values of the d.c. voltage are the same as for the anode voltage.

(ii) Two anodes carrying the d.c. current. The sum of the currents in the two anodes at

Fig. 1.— D.C. voltages under the three possible conditions of current carrying



*The Hackbridge and Hewittic Electric Co. Ltd.

every instant equals the d.c. current. As the two anodes are connected through equal arc drops to a common cathode their voltages are equal; and as the d.c. current remains constant, the fall of current in one anode and the rise of current in the other are at every instant equal, and the reactive voltages generated in the inductance of each anode circuit by these current changes are therefore also equal. The common voltage therefore follows a path midway between that of the two anodes, i.e. a sine wave lying midway between the anode voltage waves in phase and having half their amplitude.

(iii) All three anodes carrying the d.c. current. The sum of the anode currents equals the d.c. current, and by the same reasoning as for (ii) the resultant d.c. voltage is the mean of the anode voltages, which for all three phases is zero.

Two-Anode Commutation

At the beginning of the regulation curve, and down to quite a low voltage, the d.c. current is carried by each anode in turn, with an increasing period of overlap at each commutation as the load increases. This condition is shown in Fig. 2.

During each commutation a voltage corresponding to the shaded area in Fig. 2 is lost. This reactive voltage is absorbed as a result of a current rise from zero to I_d in the anode inductance L, and therefore $= I_dL$. The average d.c. voltage dropped is equal to this volt-second area dropped during each commutation, $\times$ the number of commutations each second. $e_r = I_dLpf \therefore I_dL = e_r/pf = aBN \times 10^{-8}$ .....(1) where a is the cross-sectional area of the inductor core in cm², B is the maximum flux density in lines/cm² and N is the number of turns in the inductor for each anode.

As L, p and f are constants, e_r is proportional to I_d and the regulation curve during these commutation conditions is a straight line.

It is also to be seen that aBN, from which the core section and number of turns on the inductor are determined, is proportional to the d.c. voltage drop required and independent of the current.

As the current increases the angle of overlap continues to increase and conditions are reached where not less than two anodes carry current at a time and three for a part of the cycle. These conditions are shown in Fig. 3.

Three-Anode Commutation

An increase in the d.c. voltage reactance drop is now accompanied, during any period of three-anode commutation, by a first increase of of current in one anode and a second increase in another, so that the sum of the anode currents is increased by three times the increase of current in one anode at one commutation.

The slope of the regulation curve when there is three-anode commutation is therefore one-third of that when there are not more than two anodes involved in commutation at a time. It is therefore also still a straight line.

When four-anode commutation takes place, in a true 6-phase rectifier, an increase in voltage drop will be accompanied at any period of

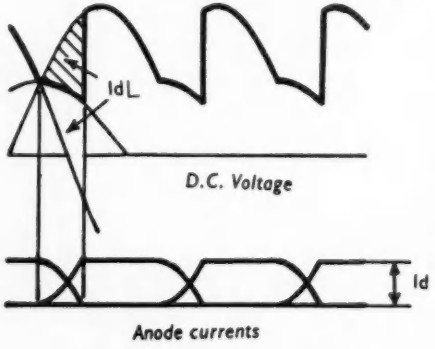


Fig 2.—*Two-anode commutation*

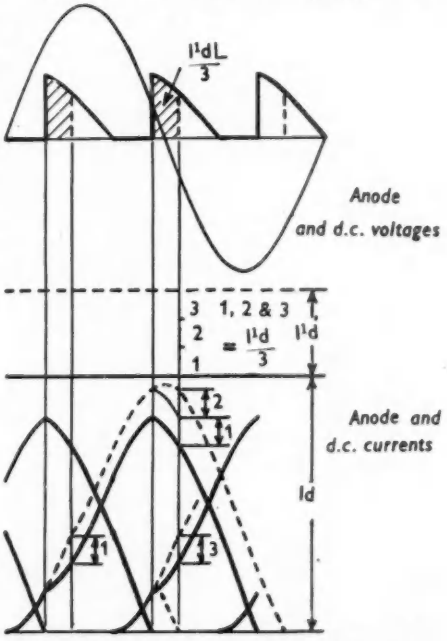


Fig 3.—*Three-anode commutation. Effect of d.c. current increase load shown dotted*

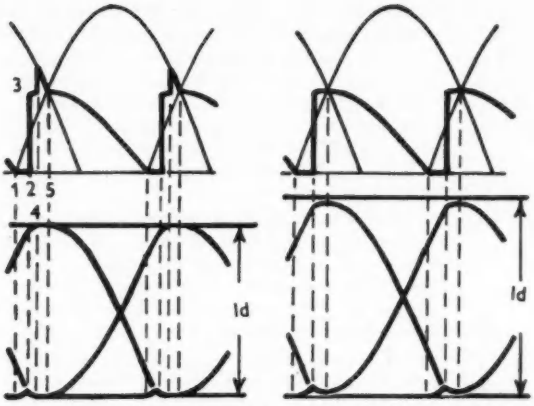


Fig. 4.—Prestriking (a) giving initial regulation slope; (b) giving final regulation slope

four-anode commutation by a first increase of current in one anode, a second increase in another, and a third increase in another, so that the total increase is six times that in one anode at one commutation. So the slope of the regulation curve is reduced to a sixth of its initial value. And so on for more phases.

Prestriking

(a) When three-anode commutation first commences, and is therefore only of short duration, the two-anode current-carrying condition it leaves is unstable, as illustrated in Fig. 4 (a).

The incoming anode begins to carry current at 1, where its voltage rises above the d.c. voltage. If the current in the outgoing anode drops to zero at 2, the d.c. voltage, which is the mean of the voltages of those anodes carrying current, jumps to 3. As the voltage of the incoming anode is now lower than the d.c. voltage, the current in it will decrease again and may drop to zero at 4. *The direct current is now carried by one anode only.* At 5 the voltage of the incoming anode again rises above the d.c. voltage and the current in it builds up again—this time continuously.

As the rise and the fall of current in the anticipatory blip are of course equal, the reactive voltage lost between 1 and 2 is regained exactly between 2 and 3. As the sum of the anode currents remains constant, the blip of current is accompanied by equal reductions of current in the other anodes. But the crucial factor is that the current in each anode does rise to the full d.c. value, and equation (1) as for two-anode commutation therefore still holds good.

(b) As the current increases the conditions are reached when the current blip rises too high—and the time available for current drop is too short—for the current to drop down to zero before it builds up again. These conditions are illustrated in Fig. 4(b).

At no time now is the d.c. current carried by only one anode, and the anode current no longer rises to the d.c. value. But a further rise in current during three-anode commutation at the beginning of an anode current-carrying period is not lost again, and the increase is repeated at the next three-anode commutation. So the regulation slope as for stable three-anode commutation now applies.

The transition point from the first regulation slope to the second is where the current blip just reaches zero before building up again, as in Fig. 4 (c).

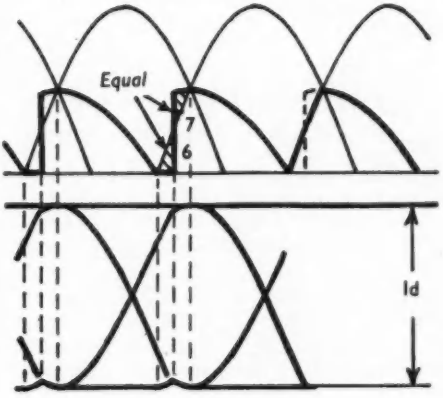
The transition voltage is readily determined by integrating the direct voltage after slightly rearranging the waveform as indicated in the figure. The shaded portion (6) representing the reactive voltage lost while the initial rise of current takes place, being exactly equal to the shaded portion (7) regained by its subsequent equal fall to zero. This transition voltage is $\cdot 302.\sqrt{2}E$.

Complete Regulation Curve

The complete regulation curve from no-load to short-circuit is therefore as shown in Fig. 5. The no-load voltage is

$$\sqrt{2}E.\frac{p}{\pi}.\sin\frac{\pi}{p} = \cdot 827.\sqrt{2}E,$$

Fig. 4. (c)—Conditions at transition point



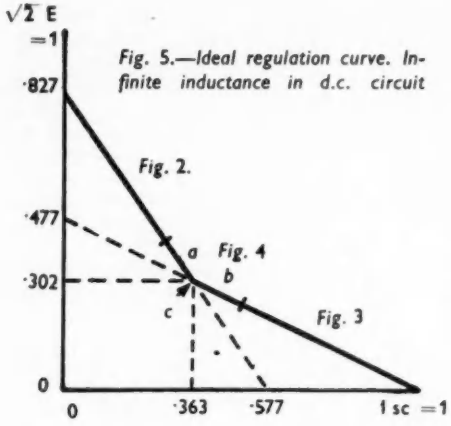


Fig. 5.—Ideal regulation curve. Infinite inductance in d.c. circuit

where E is the r.m.s. value of the anode voltage. All the voltage values include the arc drop.

This regulation curve, however, is a theoretical one only, as found in text books and approached in the laboratory.

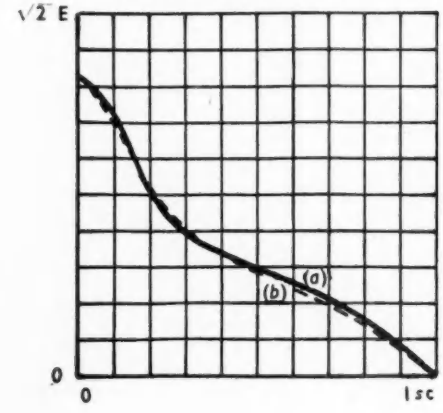
Limited Inductance in D.C. Circuit

The relationship between the d.c. current and voltage, assuming no inductance in the d.c. circuit, is very complicated and the calculation of a theoretical regulation curve would be very laborious.

A typical practical regulation curve for a 3-phase rectifier equipment with an anode inductor but not an inductor in the d.c. circuit is given in Fig. 6.

The effect of having no appreciable inductance in the d.c. circuit is not only to increase the fluctuations in the direct current *but also to alter the average value of the d.c. voltage*. The difference in the d.c. voltage obtained at a certain current with and without an inductor in the d.c. circuit may be up to the order of ten percent.

Fig. 6.—Practical regulation curves on resistive load (a) without inductor in d.c. circuit; (b) with inductor in d.c. circuit



But the most important effect on the regulation curve is to alter its shape. The slope of the curve at the operating point may be substantially increased or decreased, depending on how far down the curve the operating point is.

It is not practicable with a normal type of load to approach the condition of infinite inductance in the d.c. circuit by fitting an inductor of reasonable proportions, and the regulation curve—even with an inductor in the d.c. circuit—therefore tends appreciably towards that obtained with a purely resistive d.c. circuit.

THE CHARACTERISTICS AND DESIGN OF INDUCTORS

Three-phase Core

For economy and convenience (and also, it will be seen, efficacy) a 3-phase core is used, as shown in Fig. 7, instead of three single-phase ones.

The current in each winding produces a magnetic flux which completes its circuit through the other two limbs, dividing itself more or less equally between them. The flux change in a limb during commutation is therefore 50% greater than if each anode had a separate inductor. Equation (1) therefore becomes:—

$$aBN = \tfrac{2}{3} \cdot \frac{e_r}{pf} \times 10^8 \quad \ldots\ldots\ldots\ldots\ldots (2)$$

where aBN will give the flux linkages required for each winding.

A common core also has the effect of preventing all three anodes carrying the current together. The anode voltages themselves, being 3-phase, add up to zero. Assuming that all the magnetic flux completes its circuit through the core, the reactive e.m.f.s must also add up to zero. The resultant voltages therefore add up to zero and not more than two of them can be positive at a time.

In the case of a single-phase rectifier circuit it is necessary for the same reason to have a third limb if overlap of the two anode currents is required. The general rule is that anode currents will not flow at the same time in windings on all the limbs.

The impression given by consideration of the theoretical case of infinite inductance in the d.c.

circuit is that voltage drop by anode reactance is brought about by overlap and that a large voltage drop entails a large angle of overlap. This is a misconception. For a certain d.c. voltage reactance drop overlap is less if the inductance in the d.c. circuit is low than it is when the inductance is high. Also for a certain anode reactance, decreasing overlap by restricting the anode current-carrying period (such as by using a two-limbed core for a single-phase, full-wave anode inductor) increases the d.c. voltage drop.

This effect again is an advantage, as it tends to prevent the reduction of slope of the regulation curve arising from three-anode commutation.

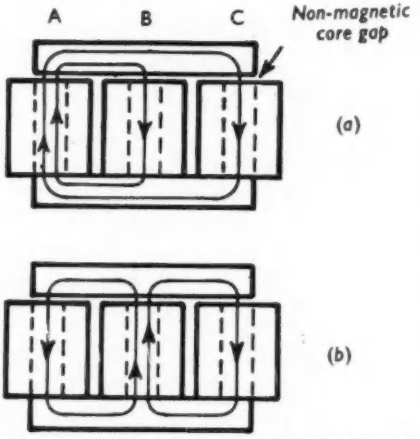


Fig. 7.—Basic construction and magnetic flux paths (a) anode A carrying current I_d; (b) after commutation to anode B

These favourable effects hold good only to the extent that there is linking of the windings not merely by the core but by the magnetic flux itself. To the extent that there is leakage flux the anode inductor will behave like three separate units.

Magnetisation Characteristic and Magnetic Flux Density

The reluctance of the magnetic flux circuit is obtained by adding the reluctance of the iron part of the circuit, at a particular flux density, to the reluctance of the non-magnetic gaps.

The resultant magnetisation characteristic of the complete flux circuit is a B/H curve straightened to a degree depending upon the total gap length as a percentage of the total flux path.

A typical iron B/H curve and derived core

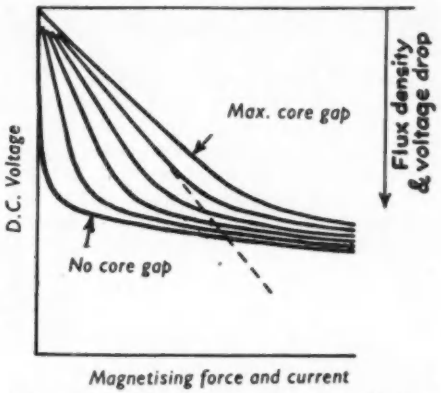


Fig. 8.—Magnetising curves and their effect on regulation curves

magnetisation characteristics for various percentage gaps are shown in Fig. 8. They are shown inverted so that they represent in form the voltage drops that would be produced by inductors having these percentage gaps, and therefore show also the form of the corresponding rectifier regulation curves. Conditions are assumed that would produce a straight-line characteristic if the inductance were constant.

The main effect of the non-linear nature of the magnetisation characteristic is to reduce the slope of the rectifier regulation curve as the core becomes saturated. As the object of having an anode inductor is generally to steepen the regulation curve, it is especially important to avoid saturation, and a magnetic flux density a little below that used for transformers is desirable. This will also ensure a little latitude for adjusting the voltage drop by adjusting the core gap.

kVA Capacity

The kVA capacity of the inductor is best expressed purely as a function of its own design and independently of the rectifier circuit and voltage. The most convenient expression for the kVA is the d.c. current times the d.c. voltage reactance drop. It should be assumed that the regulation curve of the rectifier equipment is a straight line and that the initial slope is maintained down to the operating voltage.

Iron/Copper Ratio and Core Section

To minimise the proportion of leakage flux the core gap should be small. This means obtaining the required flux linkages with relatively few turns and a relatively large core cross-section, giving a high iron to copper ratio.

The ratio of copper to iron prices is relatively high and therefore the economic optimum iron to copper ratio—the reciprocal of the cost ratio—would appear to provide a sound basis.

The practicability of a certain flux/turn ratio may be checked by calculating the core gap that will give the required flux density. This need only be approximate, and as the reluctance of the iron circuit is normally only a small percentage of that of the non-magnetic gaps it may be neglected. The flux path for each limb completes its circuit through the other two core gaps. As the latter are in parallel the total gap area for the return path is doubled and the reluctance is halved. The reluctance of each gap is therefore two-thirds the total gap reluctance of each flux circuit. The formula for the gap, in cms, then becomes:—

$$lg = \frac{2}{3} \cdot \frac{4\pi}{10} \cdot \frac{I_d N}{B} \quad \ldots\ldots\ldots\ldots\ldots\ldots (3)$$

It will be seen from this formula that the core gap is approximately proportional to the ampere-turns. To maintain a certain iron to copper ratio over a range of inductor sizes, all dimensions will increase proportionally. The core section and the total copper section will therefore increase as l^2, where l is the linear dimension. For the same winding surface temperature rise the ampere-turns will increase as $l^{3/2}$ and the core gap will increase at the same disproportional rate. To keep the gap within practicable limits the iron to copper ratio for large inductors must not be too low and, conversely, for small inductors not too high.

As the flux density may be maintained for inductors of increasing sizes, the total flux will be proportional to l^2. The kVA will therefore go up as $l^{3/2} . l^2 = l^{7/2}$.

It is convenient to draw up a standard range of core sections against kVAs as in common transformer practice. For a constant iron to copper ratio the core section will be proportional to $kVA^{4/7}$.

Design Procedure

The flux linkages aBN are purely a function of voltage. Assuming a straight-line regulation curve, and that three-anode current carrying has not commenced, aBN is proportional to the voltage drop. For a certain magnetic flux density, e.g. 10,000 lines/cm²,

$$aBN = \frac{2}{3} \cdot \frac{e_r}{3 \cdot 50} \times 10^8$$

$$\therefore aN = \frac{2}{3} \cdot \frac{e_r}{3 \cdot 50} \times 10^4 = 44 \cdot 5\, e_r \quad \ldots\ldots (4)$$

The flux density may be standard for all except very special cases and the copper section, arrangement of the windings and proportioning of the core will, in general, follow standard transformer practice.

(a) Before determining the design details of the anode inductor the no-load voltage of the rectifier equipment must be settled. This depends upon the slope of the regulation curve required at the operating point or over the operating range, and may be determined by reference to an appropriate practical regulation curve as in Fig. 6.

(b) A kVA value for the inductor is obtained as previously explained.

(c) A suitable standard core section is chosen, depending upon the kVA.

(d) aBN is calculated from equation (4).

(e) N is obtained from (c) and (d).

(f) The core gap is adjusted when the complete rectifier equipment is being tested, to give the correct d.c. voltage at I_d.

Paris–Lyons Electrification

SOME three years ago, in August 1949, we gave details of the projected rail electrification scheme on the Paris-Lyons line. This has now been completed and is in full operation. As was mentioned in our previous article the line is one of the most heavily loaded in Europe; during the summer 64 passenger trains a day run between Paris and Dijon and 42 between Dijon and Lyons. Goods traffic is also heavy averaging about 40 per day between Paris-Dijon and 50 between Dijon and Lyons.

The scheme involved 29,000 catenary supports, 1,600 miles of catenaries, 650 miles of 60 kV lines, and extensive civil, signalling, and mechanical rearrangements. Owing to the necessity for maintaining the high density traffic during operations, work had to be carried out quickly and to schedule. Some example of the speed of construction can be gained from the fact that pylons were set up at the rate of one every two minutes, and nearly a mile of catenaries was erected on three tracks in 1½ hours. Track rectifications and alterations to layout permit speeds of up to 90 m.p.h.

To operate the traffic—which is estimated to increase by 25 per cent. after electrification—231 electric locomotives have been ordered. These comprise 35 of the 2D2 type of 4,880 h.p. with a top speed of 90 m.p.h., 60 of the CC type, 4,350 h.p. for mixed services and 136 BB type with a power of 2,800 h.p. for general use. These 231 locomotives will take over the duties of some 600 steam locomotives, and will be able to haul longer and heavier trains.

METAL PURIFICATION

Electric Levitation and Heating provides Melting without Contamination

By H. WILKIN PERRY

UNIQUE, spectacular, and fascinating is the sight of a metal being melted, as a lump of it floats, bobs and rotates in air like a light ball in a jet of air with gravity overcome. This is being done successfully on an experimental scale in a research project to develop a method of liquefying certain metals to rid them of volatile impurities without permitting them to become contaminated with slight percentages of refractory solids in crucibles. This contamination will often destroy their ductility and impair the properties required for many engineering purposes.

The purpose of the project was to devise a technique for purifying metals for use in electric lamps, electronic tubes and other applications in which the metals would become incandescent in a vacuum or an inert gas but resist melting by the heat. For such uses, metals that melt only at very high temperatures, such as tungsten, vanadium, tantalum, titanium and zirconium, are required in the purest state.

Several possible ways of avoiding contamination by solids during the melting process and incorporating and homogenising alloys and other desired elements with the primary metals were considered by D. W. Wroughton and E. C. Okress, research engineers of the Westinghouse Electric Corporation and inventors of the new process, developed by three other technicians of the corporation, R. H. Brace, G. Comenetz, and J. C. R. Kelly.

Heating Method

By the novel method which the inventors decided to adopt, a small lump of metal is placed in the common axis of two conical copper coils spaced two inches apart vertically, and connected in series through a capacitor. The equipment is shown in the Westinghouse photograph reproduced herewith. Switching 10,000-cycle alternating current into the coils creates induction and eddy currents that lift the piece of metal into free suspension in the air and hold it in the axis of the coils. Soon the energy heats the metal until it glows red, then begins to soften and finally becomes a bright liquid. As melting proceeds, the specimen tends to rotate, active stirring is set up in the molten metal and it takes the shape and motion of a spinning top. The tendency to rotate can be prevented, if desired, by arranging the coils somewhat axially out of symmetry.

Curiously, the melting metal can be held suspended in the electrical field without dripping or may be allowed to drain slowly or pour

In this picture an engineer is seen examining the molten metal through a pyrometer. The equipment in the background includes the vacuum chamber removed, and one of the coils can be seen in the foreground

quickly into a crucible by arranging the lower conical coil with the apex down and suitably varying the electric current. The molten metal solidifies almost instantly in the crucible and has not time enough to absorb such contaminants as refractory alumina, thoria, beryllia and bromides.

This process is too inefficient to be applied on a large scale to common metals, but tests have been made with masses up to 550 grams of aluminium, tin, brass and titanium. Samples of aluminium, aluminium-bronze and silver have been held in stable levitation in the solid state, and aluminium floated readily in air as it melted. Molten silver, however, either moved sidewise out of the electrical field or dripped from the lower surface of the solid metal as melting proceeded.

Oxidation

Some metals, notably aluminium, quickly acquire a film of oxides or other compounds when exposed to oxygen and other gases in the air. Although the violent agitation in the melted metal would break up such a surface film, it was thought that an oxide film at the bottom of the floating metal might cause draining to start at that point and that it would be necessary to prevent this so as to assure stability of a melt made by simple solenoid coils. Therefore, melting tests were made in a vacuum. The experimenters succeeded in keeping approximately 10 grams of melted aluminium levitated in vacuum for about one minute without dripping, and they have found a means of reducing the rate of drain.

No oxide forms on silver as it melts in air but the liquid drops down as fast as formed in the induction field. And when melting was done in a vacuum jar, the inner surface became coated with opaque films that soon prevented observation of the melted silver. Titanium, on the contrary, could be melted almost completely and the molten metal held suspended between the coils without dripping.

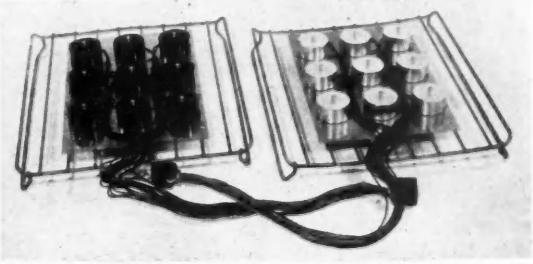
Further investigation and experimenting have been carried on by the Westinghouse group since the first of this year to determine the most efficient design of coils and other components of the equipment, the size and shape of electrically conductive solids that can be melted by the process without coming into contact with any contaminating material, and the power requirements. More and more uses for the process are being found as the development progresses. It has been hinted that some time it may be used for sintering metals as well as for adding small percentages of alloys to the melt as the magnetic field created by the energised coils holds it floating in air.

Metal 'Cakes' Aid Research

ELECTRICAL research has been conducted with many odd applications, but perhaps the most unusual in its using is queen cakes (a small cake of light pastry baked in a wafer cup) for test baking. Past experience has shown that these tasty examples of the culinary art are almost perfect "guinea-pigs," and hence have been used for some years by the G.E.C. for testing ovens.

One of the drawbacks has been that before each experiment these cakes have to be made, involving some trouble. Manufacture of imitation queen cakes from metal has not only overcome this problem, but has added several advantages. Apart from the obvious asset that they can be used a limitless number of times, these cakes incorporate sensitive temperature measuring instruments which record the heat received by each cake as the oven warms up. Heat distribution throughout the oven can be thus scientifically and accurately determined.

Moreover, methods by which heat is conveyed to the cakes are determined by giving them dull or shiny surfaces. Whereas the former surfaces absorb nearly all heat available, the latter reflects that radiated from the electric elements and absorbs only heat conducted to them by the air. In this way the research engineers are able to show that more heat is carried to the cakes by air currents than by radiation and hence design the size and position of the air vent accordingly, resulting in an improvement of the heat distribution.



Metal 'queen cakes' ready for "cooking." Those shown on the right have polished surfaces

Notes on Wiring by MEGOHM

Flameproof and Pressurised Installations

THE Ministry of Fuel and Power has classified inflammable gases into four groups:—Group 1, methane; Group 2, hydrocarbon gases, coal tar products, cellulose solvents, paints, etc.; Group 3, town's and coke oven gases; and Group 4, hydrogen, acetylene, carbon disulphide, ethyl-nitrate.

Flameproof enclosures whilst found satisfactory for Groups 1, 2 and 3 are unsuitable for Group 4 since the maximum safe gap required between machine faced joints on flameproof equipment would be too small to ensure they could be maintained under working conditions. Where the gases listed in Group 4 are known to be present, it is necessary that electrical equipment is installed outside this area, and the lighting fittings should be placed behind armoured plate glass windows so that the illumination of the working area is lighted by the lamps through the windows. An alternative method may be adopted using hermetically sealed fittings and sealing the conduit installation; both being charged to 5 lbs. per square inch with compressed air. In this type of installation a pressure operated switch is fitted which in the event of an escape of air from the system immediately cuts off the supply of electrical energy to the affected circuit.

Dust Laden Atmospheres

The problem in ignitable dust laden atmospheres is whether to use fittings strong enough to withstand an internal explosion or make them dust-tight. With temperature changes, fittings breathe, and an air change takes place with ignitable dust suspended in air being carried into the fittings. It is well to remember when dealing with gases the safest method is to provide adequate air changes, but with dust the greater the air change the more complete the combustion risk. A solution to this problem is now met by the use of hermetically sealed fittings as an alternative to heavy flameproof equipment.

Equipment for use in hazardous locations may be classified in 3 groups:—(1) Flame proof (2) Intrinsically safe and (3) Approved.

Flameproof apparatus is by far the largest of these groups and is covered by B.S.S. No. 229. Readers may have noted an interesting point that for lighting fittings the temperature on any external part of fittings must not exceed 180° F. whereas on an electrical tubular heater skin temperature may be 250° F. and upwards. This anomaly requires clarification since under certain conditions it is likely that both flameproof lighting fittings and tubular heaters will be located in the same room.

"Intrinsically safe," means, when applied to apparatus and/or a circuit, that any sparking which occurs in normal working is incapable of causing an explosion of the prescribed gas.

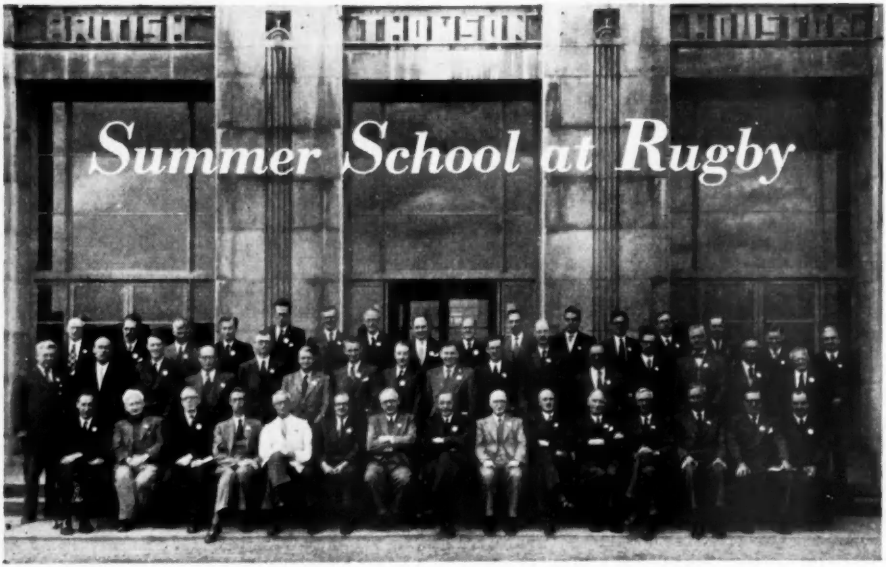
Flameproof Installations

For "flameproof" installations solid drawn conduit with screwed threads 1 in. in length entering all fittings, plus sufficient thread to accommodate a back nut, should be installed. Long runs of conduit should wherever possible be broken up, and the conduit runs isolated in sections by fitting conduit junction boxes with stoppers or hard setting compounds. This sectionalisation of the conduit system will restrict the volume in which gas may collect under fault conditions, and in consequence minimise the extent of an explosion in the event of the gases being ignited. Where the conduit installation leaves the inflammable or danger area, a conduit change or stopper box should be used comprising a two-compartment box fitted with a substantial barrier through which insulated solid terminal studs are passed.

If it is necessary to join conduits together in the danger area a flameproof union must be used and it is important that great care in erection of the equipment and conduit work is taken especially in connection with the making of joints in the conduit system. Prior to assembly the faces of joints should be lightly smeared with petroleum jelly or the like, and the faces of box lid covers treated in a similar manner. Under no circumstances should aluminium paint be used since it is possible to produce a spark by lightly striking aluminium painted surfaces with metal.

The wiring installation outside the danger area, of course, need not be flameproof and can be of a good class screwed conduit type.

Summer School at Rugby



FROM the opening by Mr. E. H. Ball (reported in last week's issue) to the close after the visit to Rugby College of Technology and Arts, the British Thomson-Houston Co.'s Summer School in Electrical Engineering, organised for professors and lecturers, provided a wealth of information on methods, techniques and developments in many aspects of this subject. Covering in its scope extensive visits to the Rugby works, the school was organised in a full and ever-varying programme, the organisational success of which was due largely to the genius of Mr. C. Grad (manager, education dept.), and the organising committee representative of all engineering sections.

Dr. K. J. R. Wilkinson (chief assistant, research laboratory), urging a more physical approach in the study of electrical engineering, commenced this avalanche of knowledge. Whereas impersonality was characteristic of the exact sciences, engineering demanded a certain personal approach. The engineer had to ask himself whether one phenomenon should be exploited or another suppressed in order that a certain end could be achieved.

In contrast to this somewhat academic question, Mr. Welch, of the aero and auto engineering department, discussed the eminently practical heavy current circuit-breakers for aircraft. This subject presented not only practical but economic problems for every extra pound mass of equipment was penalised by a loss in revenue of £100 per annum.

Later that evening and at dinner, Professor E. B. Moullin, commenting on the scarcity of engineers in industry, referred to the decline in the teachability of students and felt that this was best to be overcome by making greater use of mathematics in earlier training. One of the greatest difficulties he encountered was the diversity in quality among university undergraduates, which added to the task of advising the right students to become engineers.

Control Equipment

The following morning, the first full day was begun by a consideration of modern trends in industrial control presented by Mr. W. Spence (industrial engineering department), in which both electrical and electronic control equipment were discussed. In all control equipment simplicity was the desired end but this had to be considered against increasing complexity to obtain finer and faster control. This had resulted in a trend towards standardisation of apparatus to meet all demands and with unit construction in some cases. On the other hand, special operational requirements had to be met—control desk design was a case in point.

Although voltage regulators were primarily to be used for voltage control, they had a secondary use in VAr control. This was the keynote to the paper on the characteristics of voltage regulators for synchronous machines on power systems, presented by Mr. J. McTaggart.

Control of a.c. direct-arc furnaces presented

a variety of problems in view of the violent current variations and the certainty of short-circuits occurring. An explanation of these problems and their solution was the subject of a paper by Mr. F. D. Gunton. Basically the system developed entailed the comparison of signals proportional to arc voltage with signals proportional to arc current, any deviation from normal conditions being corrected by amplidynes controlling the electrode positioning motors.

Electronic engineering was well to the fore during the School and papers on this subject included "Modern Dielectric and Magnetic Materials and Their Use in Electrical Circuits," by Mr. W. S. Melville, indicating the use of these materials characterised by "rectangular" hysteresis loops, as switches to provide short-duration and high-peak power pulses. Further papers on "Electronic Instruments," by Mr. D. C. Thomas, who demonstrated an electro-mechanical plotter and a voltmeter of current consumption of the order of 10^{-13} amps; and the "Parallel Operation of Magnetrons," by Mr. J. H. Nicoll, concluded the morning.

Sir John Hacking is greeted on arrival

After lunch began a series of visits to various parts of the research laboratories and electronic engineering departments of the company, in which the visitors were briefly shown recent developments in electrical and magnetic spheres.

Dr. L. R. Blake, opening Wednesday morning's session, presented some post-war contributions to ferro-magnetic theory. In discussing the Domain Theory, Dr. Blake demonstrated how the domain boundaries could be seen, showing that Domains were quite independent of the grain structure of the materials. Causes of anomalous eddy current loss in ferro-magnetic sheet were then discussed, showing how changes in the magnetisation intensity varies with time.

A paper by Dr. R. Dunsmuir considered a 1 MW magnetron operating at 10 cm, the lecturer explaining its operation and modifications introduced to stabilise its performance. Further details were outlined to indicate the difficulties yet to be overcome to permit operation at higher powers.

Absorbing problems of applied research and the ways in which they were overcome formed the basis of a paper on the B.T.-H. 2 MV impulse generator and uniform field potential divider given by Mr. J. A. S. Hilditch. This equipment, a type of Marx generator, consisted of twenty-eight capacitors, each of 0·2 μFd capacitance at 100 kV working voltage, which were erected in four 30 ft columns on a 10 ft steel cabin base, in which was housed the supply transformer. A factor which had to be considered was the design of the electrodes to provide a uniform field over their circumference.

Recent advances in manufacturing technique, detailed in a paper by Mr. D. Edmundson, were conditioned as much by economic considerations as by the physical changes in equipment which have taken place in the post-war

This group visiting the Research Laboratories was engrossed in a demonstration of the cathode spot rotating in a magnetic field, whilst in the Electrical Laboratory (below) they witnessed the testing of rotor bars for flaws

years. This point was apparent in the construction of f.h.p. motors and lamination punching. In the latter example there were not only the problems of die manufacture, requiring tungsten carbide, but the type of blanking that was commensurate with minimisation of waste.

This paper brought the morning's papers to a close, to be followed after lunch by an extensive tour of the Rugby works. Much of the techniques discussed in earlier lectures were demonstrated in this tour, which covered an inspection of electrical laboratories and various production shops.

Rotating Machine Design

The Thursday morning series, with one exception, came within the province of the rotating machine design department, commencing with a paper on the "Transient Reactance of Waterwheel Alternators," by Mr. P. G. Ross. Lower values of alternator reactance were now necessary and this meant that the transient reactance was of greater importance when taken into consideration with rapid change control equipment and its value was determined by the loading and reactance factors. Although the loading factor was usually reduced, consideration was given to the reduction of the reactance factor and consequent effects on design and cost this reduction would have.

Alternating current rotating machines for aircraft was the next consideration, design problems being the major factor, in a paper by Mr. D. J. Pitstow. Here, weight and size had to be minimised, without detracting from the machine's robustness and safe operation. The space factor was also a limit, necessitating rectangular wire, for example, and minimum insulation, yet it had been found that damage due to overheating had been rare.

Replacing brass by steel in winding support rings of a.c. machines had resulted in eddy current problems, involving an energy loss of up to 20% of the total losses, discussed in a paper by Mr. K. F. Raby. By experiment and a close analysis to existing conditions, it had been possible to pre-determine these losses with a high degree of accuracy and in consequence, modify the design and position of metal structures in which these eddy currents were induced.

Eddy currents in solid yoke laminated pole d.c. generators were assumed to have too great a damping to permit a high transient response in these machines. Mr. L. C. Ludbrook indicated that these effects were, in practice, far less than the values predicted from existing theory. So far less, in fact, as to allow these machines to be used in servo-mechanisms, where the use of a laminated yoke machine would have been uneconomic.

It would appear that transformers for use at voltages above 220 kV will have layer type windings. These were the conclusions drawn by Mr. D. McDonald in a paper on this subject, paying special attention to impulse phenomena associated with these transformers.

By analysis of the two types of winding—the disc type and the layer type, he showed that the performance of the latter was fundamentally superior to the former when subjected to a unit function high voltage impulse, and consequently would be a sound economic proposition.

Grammar Schools Under Fire

Strengthened by other interested representatives, the group engaged itself in a general discussion on aspects of education and training of mutual interest. Few disagreed with the wish that public and grammar schools must be enthused with the spirit that science and engineering ranked as high as the classical subjects, and speakers' generally, stressed the value of the B.T.H. graduate apprenticeship and Research Fellowship and felt, in the former case, there should be no attempt to discontinue it.

On Friday morning, the closing sessions opened with a paper on the "Basis of Power System Design, by Mr. K. M. Jones, in which load development and the location of potential power was taken as the basis. With the assessment of future growth had to be considered co-ordination of the performance of equipment associated with power transmission so that other apparatus was not affected. An important part was the estimate of outages in bad lightning areas and the limitations of insulation and overvoltages caused by breaker operation.

The need for increased conversion efficiency at medium voltages had brought with it the development of the contact rectifier and a paper by Mr. D. R. Smith on this subject outlined problems of performance and design. Employing mechanically operated switches driven by a synchronised motor, this type of rectifier can handle currents of up to 10,000 amp at voltages between 200 and 800 V.

Following papers detailed "Recent Measuring Techniques," by Mr. J. D. Harmer, in which the measurement losses in the dielectric surrounding the high-voltage winding of a transformer was outlined, and concluded with explanations on the preparation and use of polyester resins as insulating materials, given by Mr. R. Snadow.

A visit to the Rugby College of Technology and Arts during the afternoon brought the school to a close.

Problems and Practice

IN ENGINEERING

Simple Lamp Changer

A SIMPLE tool for changing lamps which are situated some distance above the floor, without the aid of a ladder, can be made from the corrugated cardboard lamp carton and a suitably long broom handle.

The lamp is placed at one end of the carton and the lower end of the cardboard is squeezed around the end of the broom handle where it is lashed tightly in place by means of string. The carton thus becomes roughly conical in shape and the lamp forced down into the funnel thus formed becomes gripped tightly. It is often necessary to reinforce the mouth of the funnel with a few strips of adhesive tape to prevent it bursting open.

Removing a lamp with this unusual holder

To change a lamp, the carton is pushed up to engage with the defective bulb, and a sharp twist is imparted to unlock the bayonet joint. The defective lamp can then be lowered in the carton and disposed of.

The new lamp is inserted into the carton, raised to the ceiling socket where a simple push up and a twist will mount it in the batten holder. This simple lamp-changing tool can be seen in use by the staff of some London Transport stations who use it for servicing the platform lights.—*Clifford T. Bower*, A.M.I.PROD.E.

Undue Motor Acceleration

THE problem occurred on a five-ton Wellman overhead crane, its power supply being 415 V a.c. three-phase, the motors of the crane being three wound-rotor induction motors with speed control by resistances in the rotor circuit, these resistances being connected in star and divided so as to give five steps on their respective controllers. During these steps, the rotor current was altered and unbalanced until in step five the rotor was in a solid star connection and full speed was obtained.

The problem presented was that when the controller of the long travel motor was put into the first step (at which the crane normally barely moves) the crane was accelerating at full speed, but as the controller was moved further the crane slowed down to what its speed should be at the other remaining controller steps and performed normally until stopped, when again, on restarting, the rapid acceleration on the first step took place.

At first the rotor windings were suspected of having a short which was clearing itself by virtue of the centrifugal force parting the wires and keeping them apart; this was checked with an ohm-meter, but no short was discovered. The leads from the motor and rotor to the controller and resistance bank were checked for insulation and shorts; again we drew a blank. We then decided to re-wire the sections concerned and examine the wiring. The resistance section was duly overhauled and re-wired; nothing was amiss. The controller was overhauled and re-wired, and when the six leads from the controller to the motor were pulled out of their tubing it was discovered there were two of the rotor leads with bare strips adjacent to each other.

From this we assumed that the initial movement of the crane caused the wires to touch and short and the magnetic action kept them together, and then the different action in the next controller step allowed the wires to part. At any rate, the section was re-wired and the fault cleared.—*L. Pettit*.

Interpretation of
THE WIRING REGULATIONS

Some of the queries raised and the answers given by the Wiring Regulations Committee of the I.E.E.

PERIODICALLY, with the approval of the Council of the Institution, the Wiring Regulations Committee are to issue a digest of the interpretations of the Regulations for the Electrical Equipment of Buildings. These interpretations have been given to individual enquirers and the first digest has now been completed.

As many of these are of general interest, we are printing a selection of them below. It should, however, be remembered that the Institution cannot undertake to comment on particular installations or types of equipment and material, nor is the Committee empowered to deal with specific differences of opinion which may arise between supply authorities and consumers.

Ring Main Systems

One writer asked if it were permissible to use a 13-amp three-way socket-outlet adaptor connected to a ring main circuit. It was pointed out in reply that Regulation 201(C) did not provide for such adaptors. In any case, these adaptors recognised in Regulation 1301 complied to B.S. 546 and would thus be unsuitable for use with 13-amp socket-outlets to B.S. 1363.

The question of d.c. on ring main circuits was also raised. In this case, the query was put forward if it were permissible to use a 13-amp fused plug and shuttered socket in conjunction with a 15 amp switch on a circuit in accordance with Regulation 201(C). The Committee considered that 201(C) did not restrict the use of the ring main circuit to a.c. However, socket-outlets and plugs to B.S. 1363 were not always suitable for d.c. as the clearances might not be sufficient to break the circuit by withdrawal of the plug. Moreover, the fuse to B.S. 1362 was not always suitable for d.c. use where large fault currents could be expected. They pointed out, however, that a proposal had been made to the B.S.I. that a B.S. for a switch socket-outlet and fused plug suitable for d.c. should be prepared.

The subject of fuses also caused some difficulty. For example: "*Would the following arrangement comply with the Regulations? Three 5-amp socket-outlets on one circuit. Circuit wired with* 3/0·036 *cable* (10-*amp rating*). *Circuit fused at 5 amps.*" Here the situation was deemed to depend on circumstances. Normally the current should be taken at 15 amps unless there were good reasons for applying a diversity factor. If flexible cords protected by 5-amp fuses were used at outlets, the system would be consistent with Regulations 114(A) and 202(A), but here the sub-circuit fuse should also give adequate protection. Finally, it was not good practice to have a sub-circuit fuse with a current rating lower than the value of the current which would normally flow in the circuit.

The same type of problem was also raised in a query asking if it were allowable to wire two 5-amp two-pole and earth-pin socket-outlets to a final sub-circuit fused at 15 amps. The wiring again was twin 3/0·036 lead sheathed cable with earth continuity conductor. Loading at the plugs was provided by an electric iron and a television set.

In this instance the Committee pointed out that in the circuit described the conductors (rated at 10 amps) could supply three 5 amp socket-outlets. The fuse protecting the cable must, however, also be of 10 amp rating—15 amps would be a breach of Regulation 202(A). When fused plugs were used, the rating of the fuse in the plug must not exceed the rating of the associated flexible cord.

Pilot Lamp Fusing

A pilot lamp fusing problem was also brought up. "*Does Regulation* 203(*B*) *require a pilot lamp circuit, external to the case of the associated equipment, to be separately fused?*" The reply was that if the fuse protecting the sub-circuit was of the correct rating to protect an associated pilot lamp circuit, including the lampholder, no further fuse was required. Attention was drawn, however, to the necessity for using a B.22 lampholder for circuits rated between 3 and 15 amps (Regulation 606).

Dealing with the question of running a fused clock point from an existing 15 amp socket, the Committee saw no objection

provided a suitable fused connector was used. The load imposed by the clock might normally be disregarded.

Wiring Queries

Several points were raised on wiring. On the question of looping conductors at a fuseway in a distribution board, it was agreed that the practice was sound, providing that the current rating of the fuse protecting the circuit did not exceed that of the smallest cable connected to it, except as provided in Regulation 201(C) for socket-outlets feeding fused plugs. The fuse terminal must be of adequate design to accept the bunched cables and every connection mechanically and electrically sound. The "three-plate" wiring system of lighting fittings was questioned as not being in accordance with Regulation 205 on the grounds that the "live" terminal in the ceiling rose was not controlled by a switch. It was pointed out that the reference in 205 did not apply to any third terminal which might for convenience be in use in a ceiling rose, but which was not brought out to a switch. As three-plate ceiling roses were included in B.S. 67 their use was not excluded under the Regulations.

On switch wiring a question was considered on colour coding. "*Does Regulation* 309 *mean that for switch drops, cable with two red cores shall be used, and that when two-way switching is employed, cables with three red cores shall be used? If so, cables to B.S.* 7 *are unsuitable.*" The reply was—yes. No exemption was made in the regulations that phase conductors of a two-wire a.c. system or positive side of a two-conductor d.c. system should be coloured red. This was a definite requirement.

Ducts and Conduits

Running various types and systems of cable within the same conduit seemed to cause some difficulty. The Committee concurred in the running of the pair of cables feeding the busbars of a fuseboard in the same conduit as circuit cables, where both were of 250 V grade; also in the running of lighting cables in conjunction with so-called power cables and in the running of cables supplying 400 V three-phase circuits together with 230 V single-phase cables. They did not, however, approve the running of telecommunication cables in the same duct as lighting and heating cables even when 250 V grade cables were used for the communication side, or when screened microphone cable was used. Regulation 315(C), it was pointed out, was not limited to any particular voltage or types of cables.

A new problem was posed by the question: "*Is it permissible to draw wires into concrete ducts?*" These ducts were not considered when the Regulations were drawn up, and recourse had, therefore, to be made to the paragraph on page 2 of the Introduction to the Regulations. This read: "Only proved materials, appliances, and methods are considered, but it is not intended to discourage invention or to exclude other materials, appliances and methods which may be proved in the future. Where the use of a material, invention or design, which is not contemplated in the Regulations, is proposed or adopted, thereby necessitating a departure from, or rendering unnecessary (on the grounds of safety) compliance in certain respects with the Regulations, such departure or non-compliance should be the subject of the written specification of a competent body, or competent person or persons, and should result in a degree of safety from shock and fire not less than that ensured by compliance with the Regulations. Such an installation shall not, however, be described as complying with the Regulations."

Thus the use of concrete ducts was not excluded provided that the requirements of Regulations 406 (and 405) were complied with.

Earthing

Guidance was sought on several aspects of earthing. Replies given included the information that boxes used with non-metallic conduit must be earthed unless in an earth free situation (Exemption (i) to Regulation 1001(A).)

A socket-outlet can be used for the connection of fixed apparatus in a bathroom, providing it is so placed that it is not likely to be used for portable appliances (1002(A) and 1002(E).)

The "earthing lead" (0·0045 sq in.) specified in Regulation 1008 is the final conductor by which connection is made to the earth electrode, and should not be confused with the "earth continuity conductor" which "connects to the earthing lead or to each other those parts of an installation which are required to be earthed." This latter conductor may be of a smaller size (Regulation 1003 and Table 18) than the earth lead which must be run from the earth-electrode to the main distribution point.

Miscellaneous Queries

By the issue of B.S. 1670:1951, "Safety Requirements for Electric Fires," which is referred to in Regulation 1301 of the issue of the twelfth edition of the Regulations, a query was raised as to whether the requirements of Regulation 701(D) of the eleventh edition were now restored. The Committee replied that the pertinent requirements of B.S. 1670 were, in

fact, similar to those of Clause 701(D) of the eleventh edition, but referred to electric fires only.

On rural electrification it was asked if it were permissible to use a backless consumer's service unit with a wooden surround without provision of a backing of incombustible material only. The wiring installation in this case was of t.r.s. Both, however, in the circumstances covered by Regulation 1303(A) and in 1301 (which required compliance with B.S. 1454), this would be inadmissible. A unit without a back could not satisfy the requirements of the Regulations.

Two industrial queries are reported. One was where a t.r.s. three-core cable run had been installed at heights of 10 to 15 ft through working areas to supply a three-phase 440 V motor, and where the enquirer wondered if he should have used heavy-gauge screwed conduit. The reply was that Regulation 411 gave alternatives. It was considered that under the Regulations, t.r.s. cable complying with B.S. 7 and properly installed was satisfactory for medium voltage if protected where required against mechanical damage. No general ruling could be prescribed on this point.

Another question dealt with an arrangement whereby two relief pumps were operated through a standard type of contactor which was also controlled by a pressure switch. During certain operating conditions, if the stop button was pushed, the motor would stop, but immediately start again on the release of the button. The Committee considered that this did not comply with Regulation 703.

Guidance was sought on the application of Regulation 807 dealing with the installation of discharge lamps as it appeared to the enquirer that the note in section (B) was not consistent with the requirements of Clauses (A) and (B). Here the Committee pointed out that use had to be made of the current ratings in amperes available from manufacturers' data for the appropriate type of lamp and the appropriate voltage and power factor.

If the complete calculation were to be based on wattage, it would be necessary to take in the losses in auxiliaries and waveform distortion; the fact that discharge lamps were often designed for use over a range of voltage for which the current passed might substantially be the same, and the fact that the relation of current to wattage depended on the type of lamp. The note showed a straighforward type of calculation for discharge lamps.

Hay at Hams Hall

DURING the past year experiments have been carried out on the ash tip of Hams Hall "A" station, to see if it was possible to grow any useful crop on this unlikely site. In May, 1951, an area of one acre was enclosed, divided into 50 equal plots and sown with a mixture of Italian rye grass, red fescue, cocksfoot and white clover. The plots had previously received various treatments. Some were bare ash, others were dressed to various depths with soil industrial sludge from Minworth sewage works and domestic sludge from the Coleshill sewage works. Mowing first took place last August, and again in November. This year's first harvest was taken in May and the second last week.

By far the best dressing was that with domestic sewage sludge, a yield of 15 to 16 tons (fresh weight) of grass per acre being obtained. Soil dressing gave about 7 tons, while industrial sludge and ash alone gave nothing. A covering of soil on the Minworth sludge raised the yield to between 7 and 8 tons per acre.

Dr. W. J. Rees, of the Department of Botany in Birmingham University is continuing his experiments by seeding plain ash with forage plants such as sainfoin, lucerne and gorse, which he believes are the first to grow on derelict areas.

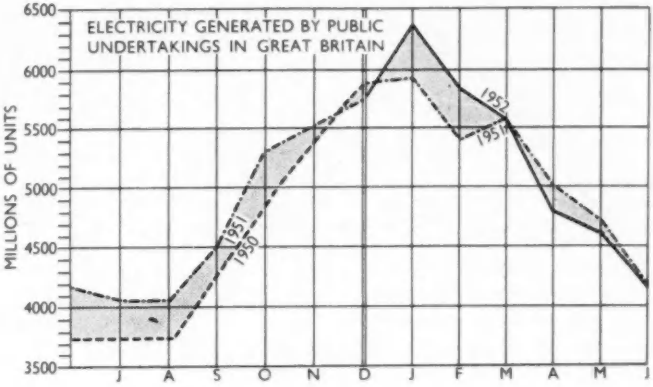
The grass harvest being gathered in on Hams Hall "A" ash tip

UNITS GENERATED

4,165 million units was the total generated during June in stations under the control of the B.E.A., the North of Scotland H.E. Board, and the Lochaber Power Co. The corresponding figure last year was 4,166 million units, so there has been virtually no change compared with twelve months ago.

Of the total, 4,058 million units was generated in steam stations and 97 million units in hydro-electric.

Energy sent out during the month was 3,915 million units, 94% of that generated. This gives the total for the year so far as 29,506 million units, showing an increase of 1.5% on the first six months of last year.



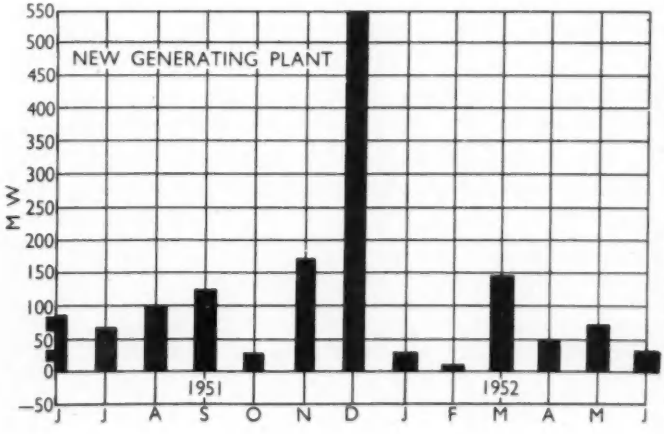
POWER SUPPLY IN JUNE

BY a remarkable coincidence, the generation figures for June are virtually identical with those for the same period last year. Thus it would appear at first sight as if the decrease in output had at last been arrested. However, when considering this, it should be noted that the average temperature in June, 1951, was 58·2° F as compared with last month's figures of 57·8° F. The units sent out, however, were slightly less, being 3,915 million in June, '52, as compared with 3,919 million in June, '51.

New Plant

As far as new generating plant is concerned, two sets have gone into commission: at Huncoat, a 30 MW G.E.C. unit, and at Poole the second Parsons 50 MW set. With the installation of the latter, Poole is, for the time being, complete, with two 50 MW Metropolitan-Vickers sets, and two Parsons sets of the same size.

A considerable number of boilers have, however, been completed. At Nechells "B" is an International Combustion unit of 230 k.lb/hr, and at Rotherham is a 200 k.lb/hr boiler also by International Combustion. Babcock and Wilcox are responsible for the following: one 300 k.lb/hr at Bromborough (Birkenhead), one 360 k.lb/hr at North Tees, and one 240 k.lb/hr unit at Staythorpe. A 305 k.lb/hr boiler by Simon Carves has also been commissioned at Huncoat in addition to the 30 MW set mentioned above.



GENERATING PLANT

At the end of June, 1952, the installed capacity of the B.E.A. was 15,992 MW, showing an increase of 20 MW during the month. During this same period the North of Scotland total went up by 1 MW to 644 MW. The month's commissioning figures bring the overall increase during the past twelve months to 1,338 MW, or 8.7% of the June, 1951, total.

The total installed capacity used for the purposes of this graph should be distinguished from the output capacity. The installed capacity is the total m.c.r. of all the generating sets which are connected on both steam (if appropriate) and electric sides and are suitable for service.

ELECTRICITY AND AGRICULTURE

Recent Report includes Progress in Crop Drying and Tractor Testing

AS would naturally be expected the Report of the National Institute of Agricultural Engineering and Scottish Machinery Testing Station (1949-51) deals principally with agrarian functions of tilling, growing and harvesting crops. The electrical interest is therefore primarily confined to such work as crop drying and special equipment designed for research work.

Crop Drying

The use of combine harvesters leads, in inclement weather conditions, to the harvesting of large quantities of wet grain. Work, therefore, began in 1949 on testing platform driers to try and improve efficiency. Approximately 70 oil-fired and several all-electric installations were in use during the 1950 harvest, which was exceptionally wet, and in August and September of that year visits were paid to some 27 farms using this type of equipment. As about 30% of these farms had no mains supply, it was recommended in the report that units should be designed to work with either an electric motor or an internal combustion engine.

It was further pointed out that at an early stage manufacturers developed all-electric platform driers, but that the Gas Council had carried out experiments with a coke-fired unit, claimed to be lower in first cost and with a lower operating cost for fuel than its equivalent oil-fired or electrically operated unit. The visits showed that no unsuspected installation troubles were occurring.

Work was also carried out on ventilated silo plant, designs for which were begun in 1949. In this case, a two-stage axial fan driven by two 2·5 h.p. motors was provided, together with an air heater of 12 kW maximum capacity. The fan intake is fitted with a 19 in. dia. inlet duct, 9 ft long, with an intake nozzle for airflow measurement.

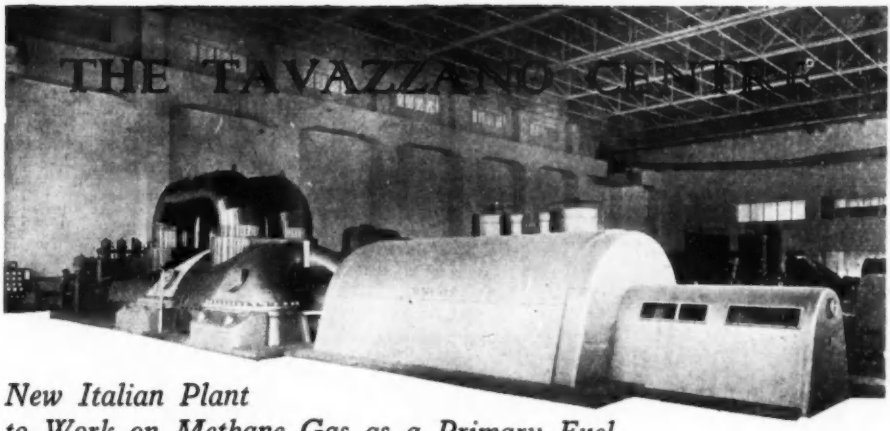
Apart from the work detailed above, experiments are being made to prevent frost damage. Large horizontal fans have been constructed, each of which is 30 ft in diameter, mounted 30 ft above ground level. When driven by 20 h.p. motors, the air beneath them was raised through a minimum of 2° F and a maximum of 7° F over an area of 3 acres. Extrapolation of test results has shown that a 60 ft fan consuming 20 h.p. would protect some 10 acres. There is no project to build this large unit, but to test the theory a 34 ft fan consuming 200 h.p. has been built with the rotor 30 ft above the ground. The results of this experiment are not given in the report.

In June, 1950, a decision was made to purchase a Kelvin and Hughes four-channel dynamic strain recording equipment. This was delivered in March, 1951, and has been used to record such items as the strain on plough bodies and the forces involved in tractor linkages. The equipment can be mounted in a vehicle and taken to site so as to obtain measurements under actual working conditions. At the Scottish Machinery Testing Station the electronic equipment was stowed in a Land Rover. When taking measurements on site, the recording equipment is connected to the strain gauges on the implement or tractor by a 50 ft length of cable to permit the Land Rover to run in safety alongside the equipment under test. The 25-core aircraft cable used for this purpose is protected against mechanical damage by a sleeve of rubber garden-type hose. Because of the length of cable a balancing unit is necessary, and 400, 800 and 1,200 pF condensers have been selected to supplement the variable capacitors provided in the bridge.

Dynamometers

As a check of gauge consistency and the Young's Modulus of the test specimens, the need to calibrate the various dynamometers against a series of known loads has arisen. A rig has therefore been planned in which dynamometers may be inserted in series with a hydraulic loading cylinder.

It is of interest to note that in connection with ploughing work, the interpretation of the records which are on Teledeltos paper presented some difficulty as the variations in load on a long record made averaging a tedious business. A special planimeter was therefore devised which gave a continuously cumulative recording of the area beneath the record, and the averaging merely becomes a matter of dividing its reading by the length of the record. Accuracy is one part in 500, and considerable interest in the instrument has been shown in other fields.



New Italian Plant to Work on Methane Gas as a Primary Fuel

By ANTONIO GIORDANO

THE increasing demand for solid and liquid fuels in Italy has led to the exploitation of natural gas, mostly methane, as a source of primary power. In consequence of this it was decided by the Azienda Generale Italiana Petroli, and the Societa Termo Elettrica Italiana to go ahead with the building of the first Italian steam-electric centre using methane gas as fuel. From this concept has arisen the project of a new steam-electric station with an installed power of 125,000 kW and with an economic load of 100,000 kW, destined to produce at least 400 million kW/hr per annum with a maximum of 700 million kW/hr. This is to use as fuel, natural gas as well as fuel oil. Subsequent to the proposal, other Italian electric enterprises, such as the Azienda Elettrica Municipale di Milano, the Edison Co., and the Acciaierie Falck, joined with the originators of the scheme, with the result that finally the capital of the Societa Termo Elettrica Italiana has been divided among five partners with a share of 20% each.

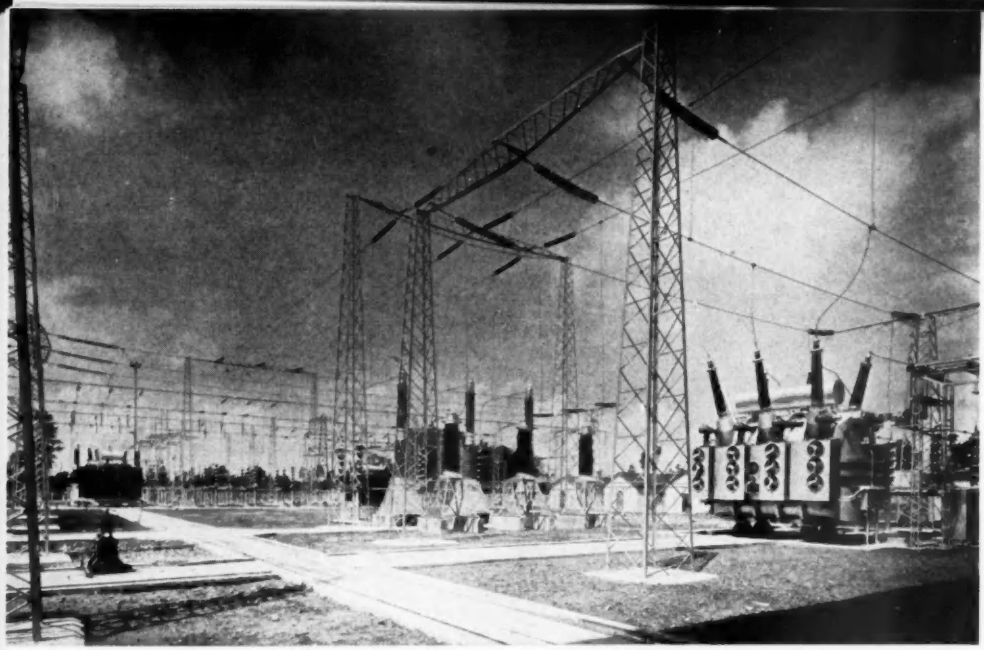
Choice of Site

The choice of Tavazzano as a site for the erection of the plant has been based on the following reasons: First, the methane wells, which guarantee the minimum cost of transport and maximum efficiency in the feeding of the boilers are comparatively close. Normally the plant will be supplied with methane from the Cornegliano field (distant about 4 km away). The gas coming from that field is sufficient in quantity to meet the requirements of the power plant, and supplies from it are estimated to have reserves to guarantee 15 years of operation. In any case it is ultimately proposed to link the Cornegliano field with the Po Valley gas-lines system. Second, is the proximity of the leading electric consumption centres, such as Milan, Piacenza, Brescia, etc., and the fact that Tavazzano is an important junction point of the Italian high-tension electric distribution lines. Third, is the fact that Tavazzano is crossed by the large irrigation canal (Muzza) derived from the River Adda, which ensures the supply of a large quantity of water (about 284 cu ft per second) for the cooling of the condensate, which eliminates the necessity of adopting a closed circuit/cooling tower system.

Supply and testing of the equipment and machinery and the survey of the construction has been entrusted to the power department of the Montecatini Co., who have carried out the work with the assistance of the Siemens-Schuckertwerke Aktiengesellschaft and the Combustion Superheater Engineering Co.

The fact that the Tavazzano centre has, as an additional objective, to demonstrate the advantage of gas combustion, forced the builders to adopt high pressures and high temperatures in order to maintain the specific consumption to the lowest possible figure.

Among the main features of the station the following points are of probable interest: The unit system has been adopted throughout. Thus the generating plant consists of two units with a maximum output of 62,500 kW, each fully separated from the other and each consisting of a single boiler, steam turbine, alternator, and main generator step-up transformer. All the auxiliary services derived from the main generators.



This photograph shows the outdoor substation with transformers and switchgear. Note the forced air cooling fans on the nearest transformer

A reheat cycle has also been used. Superheated steam is generated in the boiler at a pressure of 1,780 lb/sq in. (the maximum adopted in Italy) and at a temperature of 970° F. This supplies the high-pressure section of the turbine and after a drop to about 427 lb/sq in. is returned to the boiler, where it is, again reheated to the temperature of 950° F before entering the low-pressure section.

Exhaust fans, boiler feed pumps, water circulating pumps, and other auxiliaries are all driven by electric motors to the complete exclusion of steam-driven plant. A further unusual feature is the installation of the steam generators wholly in the open air without any building for the boilers. A single control room is used both for the steam side and for the main electrical plant and auxiliary equipment.

The electrical switchboards for the plant operate at 380 V and 6,000 V, and full protection is provided. After stepping up, power is transmitted to the Italian system via overhead lines at 130 and 220 kV.

Buildings

The main building contains the turbine-room and control-room, and has a total area of about 43,000 sq ft. The turbine-room itself has a width of 121 ft and a length of 213 ft, with a height of 85 ft. Two cranes, each with a capacity of 65 tons, are installed. The next principal building is the pumping station for the circulating water and for water purification of plant. Other buildings include a hospital, stores, garage, repair shop, and living accommodation for the permanent workers at the power station.

Owing to the nature of the subsoil, civil engineering work was most difficult. Only at a depth of 60 ft was it possible to find a solid foundation for the huge works. As a result, over 1,700 piles, with a total length of 32,740 metres, have been driven to support the main structures.

A derivation canal, with sluice gates, has been built to take water from the Muzza Canal for cooling purposes.

Boiler Plant

The steam generators have been built and installed by the Combustion Engineering Co. and are two in number, each with a normal output of 180 tons/hr and a maximum continuous rating of 216 tons/hr. They are of the natural circulation type, with upper and lower cylindrical drums. The combustion chamber is of the suspended type, supported by a system of hangers, fixed in turn to a carrying structure. The combustion chamber has a capacity of 25,000 cu ft, with bottom dimensions of 20 ft by 26 ft. The watertube walls have a surface of 1,740 sq ft. The boiler is provided with three sets of burners—two main burners (one for methane and one for fuel oil) and a third for lighting up. The working pressure is 1,850 lb/sq in. The superheater is

designed to provide constant temperature over a flow range of 148 to 215 tons/hr; the heating surface of the superheater being 23,800 sq ft. An intermediate superheater is installed over the same flow range as the main superheater, and this has a heating area of 7,300 sq ft. In addition there is an air preheater with a total heated surface of 177,000 sq ft. Under maximum load, the temperature in the combustion chamber reaches 2,160° F. The flue gas temperature when leaving the boiler is at 425° F, falling to 320° F at the bottom of the chimney. Heat insulation of the boiler is by plastic cement incorporating asbestos in the first stage and magnesite blocks in the following stages. The boiler is provided with forced draught fans for combustion air, with arrangements for servo-controlled regulation. It is furthermore fitted with induced draught fans driven by means of an hydraulic coupling for speed regulation, by an electric motor of 660 kW, 6,000 V, 585 r.p.m. Feed water is conveyed to each boiler by means of three centrifugal Klein-type pumps, directly coupled to electric motors of 1,250 kW, 6,000 V, running at 3,000 r.p.m. Each pump has a capacity of 170 tons/hr.

The main steam piping at the boiler exit has been built in Mannesmann steel pipe of the Marwe 17 L. type, with an internal diameter of 7½ in. and a wall thickness of 1·02 in. Feed water pipes are also of Mannesmann steel, with an external diameter of 8·5 in.

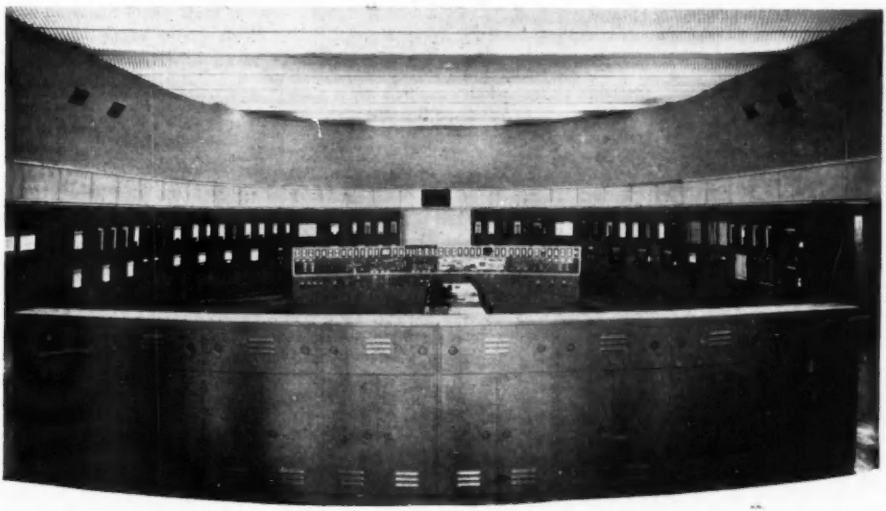
The turbines are of the three-cylinder type with a double-flow exhaust. Maximum continuous rating is 62·5 MW, with a e.c.r. of 50 MW, operating on steam at 1,780lb /sq in., 970° F. The three-phase electric generators are directly coupled to the turbines and are of the closed self-ventilated type, using hydrogen cooling. They can produce 85 MVA m.c.r. under hydrogen cooling and generate at 10·5 kV at the tail ends. The speed of the sets is 3,000 r.p.m.

Lubrication is carried out with a coaxial centrifugal pump, and steam regulation is by means of a hydraulic system complete with overload protection. Twin condensers are used, extraction of the condensate being by means of two pumps.

Before being conveyed to the boilers, the methane gas is washed and filtered. For fuel oil combustion there has been provided a 105,000 cu ft capacity tank connected to the boilers by means of a pumping station and a steam-heated pipeline. The open-air transformer substation contains two main transformers of 75 MVA to connect with the 130 kV and with the 220 kV high-tension distribution systems, together with two auxiliary transformers rated at 6,300 kVA.

The cost of building the Tavazzano steam station is in the following proportions: 61·2% is the cost of the machinery and equipment; 14·7% the cost of buildings; 6·8% the cost of steam and electric plant switchboards; 5·9% general expenses; and 5·4% interest paid on the loans obtained to finance the carrying out of the project.

This view shows the simplicity of layout adopted in the central control room



overseas news

Tasmania's Record

Port Arthur, the last main municipal centre in Tasmania without electric power, except for Flinders Island, was connected to the system of the Hydro-Electric Commission of Tasmania a few days ago. The switching-in ceremony was performed by the Premier, Mr. Cosgrove, who said the Hydro-Electric Commission was proud of its record. No country in the world had such widespread country extensions as Tasmania.

The extension to Port Arthur was uneconomic and was likely to remain so, he added. It had meant 60 miles of h.t. lines and a further 25 miles of l.t. lines. A total of 390 consumers would be served and 360 were already connected. The estimated cost of the extension in 1946 was nearly £21,000, of which the State Government provided nearly £16,000 and the commission £5,000. The government was to provide an annual subsidy of £1,300 and the commission was expected to have to meet a further loss of £300 a year.

Manufacturers Object

Evidently an outcome of the criticisms voiced at the recent meeting of the Sydney County Council (reported in our July 3 issue) of the comparative high prices of certain locally manufactured electrical equipment, a warning that Australian manufacturers would soon be out of business if publicly owned authorities continued to order extensively from overseas manufacturers, was given last week by Mr. Latham Withall, director of Associated Chambers of Manufacturers of Australia. Mr. Withall was especially concerned with the electrical industry, which, he said, was suffering because British manufacturers were offering goods at as much as 45% below the lowest Australian tenders. The reasons for this, he maintained, were that the hourly wage rate for skilled labour in the Australian electrical industry was more than double the British rate, and also, that United Kingdom manufacturers were using an anomaly in the Australian tariff to evade customs duty.

Flood Danger

Flooding of the River Nive caused the temporary shutting down of the Tarraleah power station of the Hydro-Electric Commission of Tasmania recently. At one time water crept to within a few inches of the station switchyard and reached the level of the power station floor. The shutting down was only a precautionary measure, and when the rise halted the generating sets were put into operation again. The Hydro-Electric Commissioner, Mr. Knight, subsequently explained that the Nive had reached record flood levels because of the amount of snow in the catchment areas which had melted when warm rain fell. But the water storage position only improved about 5% and was still approximately 45% of capacity, so there could not be any review of the power rationing position. He said water was only 12 ft from the top of the Clark dam at Butlers Gorge, the biggest quantity it had held since its construction.

Parsons Set at Moose Jaw

A new 20,000 h.p. turbo-generator manufactured by C. A. Parsons and Co., Ltd., was put into operation a few days ago at the Moose Jaw, Saskatchewan, plant of the National Light and Power Co. The set operates at a steam pressure of 600 lb/sq in., and a temperature of 800° F. The generating voltage is 13,800, and power is transmitted direct to two new substations. With this new set, the installed capacity of the Moose Jaw station is 46,000 h.p.; it is estimated that the winter peak load will reach about 25,000 h.p., so there is now adequate reserve in hand.

Rural Plans

A five-year plan for the electrification of rural Prince Edward Island with public ownership of all new lines and of main power lines, with the whole programme, apparently based on an appeal to Ottawa for money, to promote the development and the resultant extension of long term credit to those who would need it to pay installation costs, was the suggestion made at a meeting of the Federation of Agriculture. Discussion was mainly on the cost of current now available, and the urgent need for supplies in other areas. Also suggested was the matter of investigating the feasibility of establishing a Maritime Power Commission with a view "to more economic production and distribution of electrical energy."

Schemes Approved

Pakistan's Planning Commission has now approved three major hydro projects costing Rs. 250 m. Between them they will produce 375,000 kW of electrical energy. Two major irrigation schemes, estimated to cost Rs. 300 m., were also approved, and the commission adopted a proposal for the setting up of four more radio transmitters. Official sources have stated that orders for the necessary equipment will be placed as soon as approved schemes have received the assent of the Economic Council of Pakistan.

Assistance Provided

Under an agreement recently signed in Delhi, the U.S. Government has promised to provide equipment and supplies of the value of $4,784,000

to assist in the construction of dams, irrigation canals and power plants in India. The Government of India's contribution for this project will be Rs 5 lakhs. The equipments will be provided for some of the irrigation and power projects approved in the Five Year Plan including the Hirakud project, in Orissa, and the Kakarpar project, the Mahi project and the Ghataprabha project in Bombay.

Objection to Italian H.E. Plan

Plans for the construction of new hydro-electric plant in the Italian national park of Gran Paradiso, lying between Turin and Aosta, have been jeopardised by a ruling last week of the Turin court that all work on the project (which it is agreed has been going on illegally for about a year) must be suspended. The area is one in which the ibex and many other wild animals live, and fears for their continued existence were expressed. The Turin court, it seems, made a similar suspension order last year, but the Ministry of Public Works intervened and over-ruled it. But on an appeal by the national park organisation, the Supreme Court in Rome reaffirmed the competence of the Turin court and declared the Ministry's interference illegal. Unless a compromise is reached between the parties concerned it seems that the project may be abandoned. Before giving the court ruling, the judge referred to the possible consequences of the continuance of the work on the scheme such as the disappearance of valuable fauna, and disturbance of the hydraulic system. But it has been pointed out that when arguments were advanced, based on the important economic and social interests which the electricity company were pursuing, it was forgotten that the park's action to safeguard its rights did not prevent the continuation of those interests, but only rendered them more expensive by demanding that the company's power lines should follow a different, and longer, route, but one which respected the rights of others.

Railway Electrification

The East German Railways are shortly to be electrified, with Soviet assistance, it is announced. Under this plan, the first electric train is scheduled to operate in June, 1953. The scheme also involves the construction of two power stations with a capacity of 100 MW, it is stated.

Lights Up in Cairo?

Somewhat later than had been originally anticipated, the first unit at the new 60 MW Cairo North power station, is due to go on commercial load within the next few days, according to reports. Locally it is hoped that this will mean the lifting of restrictions on shop-front lighting and electric signs which have been in force in the capital for the last two years. The new station has been erected at Shubra on the Ismalia Canal at the instance of the Cairo Electricity Administration.

Other news from Cairo is that the Council of Ministers have approved a decree increasing the credit allotted to the Aswan Dam hydro-electric scheme from £E24·6m. to £E27·5 million indicating that the cost of the hydro-electric part of the project has risen since the last revision of costs was made. There is, as yet, no news of the award of the contract for the civil construction work of this scheme.

Project for Turkey

Work is now well under way on the $47 million hydro-electric project at Sariyar, between Ankara and Istanbul, which is scheduled to supply power to the latter city and the whole north west of Anatolia by 1955. Under the first section of the scheme, the whole of which is financed jointly by the Turkish Government and the Mutual Security Administration, a 1,000-metre tunnel 9·6 metres in diameter is to be blasted through the mountain around which the Sakarya river bends. A 160-metre high dam will build up a reservoir to supply water to the station which will house two 65,000 h.p. turbines of German manufacture. With the completion of the project, it is planned that many of the existing scattered thermal power stations in north-west Anatolia will be closed down, thereby saving in solid fuel costs.

Bloemfontein Results

The operations of the Bloemfontein Corporation Electricity Department for the year ended March 31, 1951, resulted in a profit of £123,350, but after payment of interest, redemption, depreciation, etc., and transferring £48,187 to the relief of local rates, there is a balance of £52,648. Revenue from all sources totalled £281,106, and the total running costs were £157,755 (an average of 0·6d. per unit sold). The average revenue per unit sold was 1·062d. Extensions to the power station, as part of a scheme estimated to cost £2,500,000, are under way, reference to which has already been made in our pages.

Fuel and Power Commission

The New Zealand Government is considering setting up a Fuel and Power Commission, the Prime Minister, Mr. Holland, has announced. It is presumed that such an organisation would advise the Government on problems arising out of the production and distribution of fuel, heat and power, but other details are awaited.

Brazil's Development

For the construction of a new thermal power station at Candista in the State of Rio Grande do Sul, Brazil, a credit of 150 million cruzeiros has been opened. Of that sum 75 million cruzeiros will be spent on machinery. The site of the new station is amid the Rio Grande coalfields where large reserves of fuel are believed to exist, and with this low cost fuel, it is expected that the station will be able to provide cheap electricity in the surrounding area.

PERSONALITIES

IN THE INDUSTRY

We hear that **Mr. W. Harris,** B.SC.(ENG.), has joined Aberdare Cables Ltd., and South Wales Switchgear Ltd., and is to represent those companies in North-west England and North Wales. For the past four years Mr. Harris has been senior assistant construction engineer at the headquarters of the North Western Electricity Board. He obtained his degree in engineering in London and gained early training with Ferguson Pailin Ltd., with whom he was employed for about 14 years. He subsequently served for ten years with the Manchester Corporation undertaking in the construction department.

Mr. W. Harris

Mr. Harold Wilson, assistant district engineer of the North-Western Electricity Board's Radcliffe Sub-district retires next month, thus severing a 46 years' connection with the town's electricity undertaking. Before nationalisation he was chief assistant engineer of Radcliffe Corporation Electricity Department for more than 30 years.

Mr. H. J. London, A.M.I.E.E., A.R.C.S., partner in the firm of Preece, Cardew and Rider, the consulting engineers, has been nominated to advise the New Zealand State Hydro Electric Department on the establishment of a 100MW coal-burning power station in New Zealand, to which we referred last week (p. 113). Mr. London left this country by air yesterday, July 23, and expects to be away about six weeks, he tells us.

Mr. W. Shires, commercial engineer for the Macclesfield district, No. 7 sub-area of the North Western Electricity Board, has been appointed to a similar position in the board's Stalybridge district, No. 3 sub-area.

Mr. E. Howard, F.I.E.S., city lighting engineer of Nottingham, will be installed as president of the Association of Public Lighting Engineers at the annual conference of that body to be held at Harrogate from September 16 to 19.

Those who have agitated for the inclusion of a representative of the farming community as a part-time member of the South Wales Electricity Board should be happy now. The Minister of Fuel and Power has remedied the matter by appointing **Mr. H. G. Partridge** to the Board. He is an active member of the Cardiganshire Farmers' Union.

The Institute of Physics announces the following elections which were made last Thursday: Fellows: **Messrs. A. D. Booth** (London); **T. W. F. Brown** (Wallsend); **K. Deutsch** (Welwyn, Herts); **R. Meredith** (Manchester); **H. S. Peiser** (Sheffield); and **J. Savage** (London). Elected Associates are: **Messrs. F. Bovey** (Reading); **W. S. Brown** (Smethwick); **P. L. Degen** (Ilford); **A. Fonda** (London); **N. F. Godwin** (Chertsey); **S. Guest** (Edinburgh); **J. P. Morrison** (Pontypool); **R. G. Rhodes** (Aldermaston); **N. Sheppard** (Cambridge); **E. D. Thomas** (Burnley); and **C. E. Williams** (Wembley). In addition, 24 Graduates, 3 Subscribers and 6 Students were elected.

Mr. F. Graucob, managing director of Nu-Swift, Ltd., has been elected chairman instead of **Mr. A. Harland,** who has resigned owing to advancing years. Mr. Harland has accepted the honorary post as president of the company. **Mr. E. E. C. Cawood,** M.B.E., general manager, has been appointed technical director.

It is announced that **Mr. A. G. H. Pritchett** has been appointed general sales manager of Chamberlain Industries, Ltd. He has as his deputy **Mr. D. S. Jordan,** A.S.M.A.

Mr. E. A. Leach, a director of Marco Refrigerators, Ltd., has been appointed secretary of the company in succession to **Mr. A. F. Donald.**

The award of an honorary D.SC. degree has been conferred by the University of Wales upon **Mr. I. R. Cox,** D.S.O., B.SC., M.I.MECH.E., A.M.INST.C.E., managing director of the Metropolitan-Vickers Electrical Co., Ltd., "in recognition of his outstanding position in the electrical industry," it was announced at the annual collegiate meeting of the Court of the University last Thursday. Mr. Cox was born in Cardiff, and took his degree at University College, Cardiff, where he was South Wales Institute of Engineers scholar and Page prizeman. He started with Metropolitan-Vickers (then British Westinghouse) as a college apprentice.

Mr. I. R. Cox, right, receives congratulations

Previously for many years with Marconi Instruments, Ltd., **Mr. E. D. Hart,** M.A., A.Inst.P., A.M.I.E.E., has joined the Equipment Division of Mullard, Ltd., where, as head of the Technical Department, he is responsible for market surveys, technical publications and other technical commercial activities. With Marconi's, Mr. Hart was engaged in an engineering capacity for some time, and latterly on the commercial side, where he was well known as technical editor of *Marconi Instrumentation*. He is also chairman of the recently formed Joint Advisory Committee on Radio Communication and Radar Measuring Instruments.

Mr. E. D. Hart

The marriage of **Miss Hermione S. O'B. Hoare** (public relations officer to the E.I.B.A. and formerly of Ferranti, Ltd.) to **Lord Colwyn,** took place at Caxton Hall last Friday. At the reception which followed the many guests included a number of friends in the electrical industry.

Lord Colwyn and Miss Hoare after the ceremony

The Minister of Fuel and Power has made a number of appointments and re-appointments to the Midlands Electricity Consultative Council. The Council is now constituted as follows: Chairman: Ald. H. Leason, J.P., A.M.I.E.E.; Deputy Chairman: Ald. the Rev. R. A. Giles, M.A., B.Litt. (Shifnal); Members: Cllr. G. T. Baldwin (Malvern Link), Cllr. E. Bond (Newcastle-under-Lyme), Mr. W. H. Bridgens (Moseley), Cllr. H. T. Bush, J.P. (Cheltenham), Mrs. G. E. Crabtree, J.P. (Sutton Coldfield), Mr. F. J. Gimson (Knightwick), Cllr. Mrs. M. Gunn, J.P. (Oldbury), Cllr. D. W. Hamlen-Williams (Leominster), Alderman J. W. Hughes (Redditch), Alderman Mrs. N. Hyde, O.B.E., J.P. (King's Heath), Mrs. M. Jacob (Lichfield), Mr. E. G. Johnson (Ross-on-Wye), Col. Sir John Kent, C.B.E., D.S.O., T.D., D.L., J.P. (nr. Crewe), Mr. F. W. Martin (Birmingham), Alderman W. Nevill, O.B.E., J.P. (Walsall), Cllr. A. J. Parker (Cheltenham), Mr. H. F. Parker (Bridgnorth), Cllr. H. C. Plant, J.P. (Stafford), Cllr. H. Preece (Wolverhampton), Mr. G. Reeve, J.P. (Birmingham), Cllr. Major E. J. Rowberry, J.P. (Ross-on-Wye), Cllr. J. W. Smout (Coseley), Cllr. G. Tatton (Leek), Cllr. H. C. Taylor (Shirley) and Mr. F. G. Wynne, A.M.I.E.E. (Dudley).

Mr. R. H. M. Drake, M.A.(Oxon), has been elected as the new president of the Electrical Industries Benevolent Association in succession to Mr. C. R. King. Mr. Drake is chairman and managing director of Drake and Gorham, Ltd. and three times past president of the Electrical Contractors Association. A very popular figure, he has been prominently connected with the electrical contracting industry for many years. His election to the E.I.B.A. will be applauded.

Mr. R. H. M. Drake

To succeed **Sir William Haley,** who has resigned from the position of director-general of the B.B.C., with effect from September 30, **Mr. B. E. Nicholls,** who is the director of home (sound) broadcasting, has been appointed as acting director-general from August 1 until a permanent appointment can be made.

Philips Electrical Ltd. announce that **Mr. A. W. Gostt,** F.I.E.S., Assoc. A.P.L.E., has been appointed light group sales manager (technical). Mr. Gostt, who received his technical education at the Regent Street Polytechnic, entered the lighting industry in 1924 when he joined Metropolitan-Vickers Electrical Co. Ltd. In 1929 he became an illuminating engineer with Philips, and in 1950 was appointed manager of the Fluorescent and Electric Discharge Lamp Department. Mr. Gostt is a member of a number of industry committees dealing with lamps and lighting equipment.

Mr. A. W. Gostt

OBITUARY

Mr. A. R. McClelland, a director of Falk Stadelmann and Co. Ltd., died recently, aged 81. He had been with that company since 1886, and although he retired from active business a few years ago, he remained on the board.

Mr. H. W. Lodge, public lighting superintendent to Halifax Corporation since July, 1943, died recently, aged 58. A member of the A.P.L.E., he earlier held a similar post at Burnley for about 10 years.

Mr. J. N. Wilson, M.B.E., a former general manager of Glasgow Corporation Transport undertaking, died on July 18.

Mr. William Shearer, chairman and managing director of Power Securities Corporation, Ltd., chairman of Balfour, Beatty and Co., and a director of numerous electrical and industrial concerns, died on July 16, aged 70. A Scotsman, his early training was in Law in Edinburgh, before he joined Balfour, Beatty and Co. in 1909 with whom he gained considerable experience. But it was in connection with the financing of electricity supply companies in their comparatively early development period, when his drive and shrewd foresight were invaluable, that he became prominently known in the electrical industry. During that period he was concerned with such large undertakings as the Scottish Power Co., the Lancashire Electric Light and Power Co., the Midland Counties Electric Supply Co., and the Metropolitan Electric Supply Co., Ltd., in addition to numerous other smaller concerns such as the Uxbridge and District Electric Supply Co., and the Tamworth District Electric Supply Co. He was also actively engaged in overseas undertakings such as the East African Power and Lighting Co. (of which he was chairman of the London board), the Jerusalem Electric and Public Service Corporation, and the Perak River Hydro-Electric Co. A memorial service for the late William Shearer will take place at St. Martin-in-the-Fields, Trafalgar Square, on July 30, at 12.30 p.m.

Mr. W. Brown, M.Inst.C.E., M.I.E.E., A.M.I.Mech.E., generation engineer (construction) to the East Midlands Division of the B.E.A., died on July 18. Prior to nationalisation of the supply industry, he was for 18 years chief technical engineer to the Central England district of the Central Electricity Board. Educated at Manchester University, and trained with Willans and Robinson, he joined Leeds Electricity Department and then spent short periods with the Newcastle-upon-Tyne Electric Supply Co., the Scottish Central Electric Power Co., the Brush Electrical Engineering Co., and as assistant substation and transmission engineer to the North Metropolitan Electric Power Supply Co. prior to serving in the 1914-18 war. Returning to civilian life he was resident engineer to the North Met. Co., from 1919 to 1923 and from then till joining the C.E.B. in 1930 he was one of H.M. electrical inspectors of factories.

Mr. E. Leslie Potter, chief chemist of the Micanite and Insulators Co., Ltd., and British Tego Gluefilm, Ltd., died on July 14, 1952, aged 56. He joined M. and I. in 1919.

Mr. G. Littler, radio representative in the Lancashire and Cheshire area to Philips Electrical, Ltd., died on July 13, aged 55.

NEW LITERATURE

The Magnetron

by R. Latham, M.A., Ph.D., *A. H. King,* M.A., *and L. Rushforth,* B.Sc., M.I.E.E.

WARTIME development turned ultra high frequency work from being the study of a privileged few into a major industry. As the most convenient source of centimetric waves used in radar, work on the magnetron was caught up in this tide of expansion and until recently few details of the advances made were generally available in book form. In the present volume the authors have outlined modern theory and practices which influence the production of the magnetron with a two-fold purpose. An attempt is made to explain the magnetron and its action in terms comprehensible to the reader with a conventional technical knowledge. At the same time information is provided for the guidance and use of physicists and technicians concerned with research and production in this sphere, particular attention being paid to the application of magnetrons to radar.

No claim is made by the authors to have covered the entire subject, but one is left with the impression that here is a book which, as a source of information, both general and particular, will be of value for some considerable time to come. Treatment of theory is of necessity mathematical, but sufficient explanatory preamble is provided to give a picture of the principles of operation and to illustrate problems of design which are encountered. For those whose work will require deeper study, references given make up for any simplification for the benefit of the untutored eye. Published by Chapman and Hall, 142 pages, 8½ in. by 5½ in., price 18s.

NEW BOOKS

The Engineer's Approach to the Economics of Production by J. R. Dick. A working volume principally concerned with eliciting the true meanings of technical and commercial efficiency. Published by Pitman, 248 pages, 8½ in. by 5½ in. Price 21s.

Electrical Communications Experiments, by H. R. Real and others. Laboratory manual-cum-textbook covering instruction for 60 experiments at undergraduate level. Published by Chapman and Hall, 458 pages, 9 in. by 6 in. Price 54s.

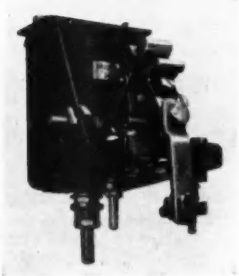
Electric Lifts, by L. J. Gooch. Maintenance and fault location notes for the electrical contractor and works engineer. Published by Marryat and Scott Ltd., 40 Hatton Garden, E.C.1., 81 pages, 7¼ in. by 4¾ in. 2nd edition, price 15s.

The Economic Aspects of Nationalisation in Great Britain, by A. M. de Neuman. Published by Students' Bookshop Ltd., Trumpington Street, Cambridge, 52 pages, 10½ in. by 7½ in. Price 8s. 6d.

The BUYER'S *Column*

Deren D.80 Contactors

USED extensively in boat davit and winch control panels and in the control units of battery-operated electric vehicles the new D.80 contactor introduced by DE RENZI HOLMES & CO., LTD., Fox's Lane, Wolverhampton, comprises heavy steel pressings, sheradised against rust and extruded metal for the contact supports and current - carrying parts.



The Deren D.80 contactor

Standard O.B. contact tips which are easily accessible for renewal are fitted in the unit, which is notable because the whole of the moving parts, including flexible connections, can be removed from the front of the frame without disturbing. When blow-out coils are fitted, the standard O.B. pattern is used mounted on stainless steel brackets.

The main spindle is fastened to the moving armature so that it turns with the armature and auxiliary switches, as required, can be operated from extension of the spindle.

Tunion's Multi-Plug Base

RECENT addition to range of Tunion accessories produced by GEORGE TURNOCK LTD., Tunion Works, Navigation St., Walsall, Staffs., is the TM.67/13 multi-plug base.

This is a socket capable of taking either a 15-amp or 5-amp 3-pin standard plug by an unusual arrangement of the plug pin guides. It will prove useful where only one 15-amp point is installed and appliances fitted with 5-amp plugs are required.

The interior is a porcelain base with brass and copper terminal blocks and pin clamps with brown plastic cover fixed by a single screw. The porcelain base is provided with keyways in which rest shoulders moulded as part of the cover.

Retail price of the TM.67/13 accessory is 5s. 3d.

"Klink" Re-Usable Ice-Cubes

ICE-CUBES which can be re-used are the novel introduction of H. H. FREEMAN & CO., LTD. 44 London Rd., Kingston, Surrey.

Ice is the cooling medium involved, but with a difference. It is contained in a waterproof plastic "envelope." When the ice has melted after absorbing the heat from a substance it does not spoil or damage that substance by soaking it in water. The cube is merely removed and placed in the ice-cube tray of a refrigerator where it again becomes ice for re-use.

A number of uses will suggest themselves to the intelligent housewife, particularly in soft drinks and alcoholic drinks which tend to lose their strength and flavour when over-diluted by melting ice. Salads for picnics and sandwiches remain fresh when a Klink cube is used. Wrapped in a thick towel or similar material the Klink cubes will not absorb enough heat to melt for at least six hours and are, therefore, ideal for serving cold drinks on picnics, at the tennis club, etc.

Retail price from the manufacturers is 10s. 6d. per box of six cubes.

Nine New G.E.C. Radio Batteries

SUPPLIED in attractive new style cartons are seven all-dry low tension batteries just added to the Blue Label range supplied by the GENERAL ELECTRIC CO. LTD., Magnet Hse., Kingsway, W.C.2

Two further layer-type batteries have been added to the Red Label range of the G.E.C.

All have been designed for the newest battery portable and mains/battery radio receivers.

Decorative Diffuser Attachments

SCEMCO 55 diffuser attachments are designed to be fitted to the two and four lamp industrial pattern fittings which are marketed by the firm, SCEMCO, LTD., Soho Street, London W.1.

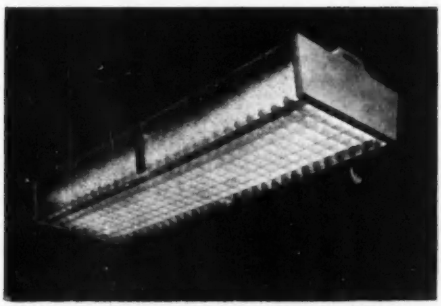
Diamond sparkle glass side panels are held in position by simple yet attractive metal end plates, finished cream; whilst underneath is suspended for easy removal and cleaning, an egg-box louvre in white stove enamel.

These diffusers are designed for two or four lamps and are available for all sizes of lamps. They can also be fitted in continuous runs for installations in large rooms and buildings.

Prices are as follows:

2-lamp diffusers

2 ft, 20 W	... ...	£2 10s., plus p.t. 12s. 6d.
2 ft, 40 W	... ...	£2 10s., plus p.t. 12s. 6d.



This is the Scemco "55" for 4 four ft. 40w tubes

4 ft, 40 W ... ... £4 4s., plus p.t. £1 1s.
5 ft. 80 W ... ... £5 5s., plus p.t. £1 5s.
4-lamp diffusers
2 ft, 20 W and 40 W £2 18s., plus p.t. 14s. 6d.
Prices for 4 and 5 ft units are as for 2-lamp types.

Air-Conditioned Living

AN answer to low cost air conditioning is claimed by COLLARO LTD., Ripple Road, Barking, with their portable fan heater which costs £9 18s., including tax.

Useful yet inexpensive is the Collaro fan heater

Sixteen inches high, with an overall bowl diameter of 12 in., the heater is neat in size yet quickly disperses throughout the room an adequate stream of warm, comfortable air.

In hot weather, the unit is used as a fan. Shutters, controlled by a simple knob, control the direction of the air flow and prevent draughts.

The fan heater is for 200/250 a.c. supplies. Its associated heating element is rated at 1½ kW. The whole unit is finished in cream or eau-de-nil.

First-Class Accessories

TERMINAL blocks supplied by GRELCO, LTD., Hopcott, Minehead, Somerset, are moulded in best black Bakelite material and have a clean, polished finish. Fitted with brass inserts eccentrically drilled to provide extra threads for clamping screws, the blocks have machine-turned screws with large heads and smooth ends to avoid damage to conductors.

The M, RS, R and S types which carry 20 amps have been tested to breakdown voltages between 5,000 and 6,000 volts. The L type will carry 60 amps, and due to the design breakdown voltage of these is higher.

Another "Grelco" product which is now widely known is the range of multiplug adaptors. Moulded in brown plastic material, the range includes 2 amp. 2-pin, 5 amp. 2- and 3-pin patterns. Combination 5/2 amp. 2- and 3-pin types and units for 15/5 5/2 amp. operation.

"Dust Control by Rotoclone"

THIS is the title of a new brochure just published by AIR CONTROL INSTALLATIONS LTD., Ruislip, Middlesex, which draws attention to the plant and equipment produced by the company.

The "Rotoclone" is a combined fan and dust collector in a single unit which, in the opinion of the makers, functions with a higher efficiency than the standard exhauster, cyclone or filter.

There are several distinct types which have been designed from the outset for different functions. Type D is a small model for volumes up to 10,000 cfm. It has a cast-iron housing and is suitable for the dry collection of all granular dusts. Type F is for similar duties, but is for large volumes up to 50,000 cfm. Type W is a dynamic precipitator which incorporates water sprays for a scrubbing action, and is available in volumes up to 50,000 cfm with three alternative methods of sludge disposal. Type N is a hydrostatic precipitator which cleans the air by a water curtain induced by the flow of air through the collector. It has no moving parts, pumps or auxiliary equipment and is therefore suitable for handling explosive dusts, for chemicals, etc.

Thought for Fishes

ESPECIALLY designed for aquaria are the heater and thermostat products of EVANS ELECTRONIC DEVELOPMENTS LTD., Buckfield Rd., Birmingham 19.

Providing constant temperature control so essential for some of the tropical varieties fancied by many aquarists, these heaters and associated thermostats are covered by a six months guarantee.

Coiled-coil elements of first grade nickel-chrome wire, wound on to a refractory former comprise the heaters which are supplied for all mains voltages in the wattages ranging in eight stages from 25 W to 150 W.

There are two patterns of thermostats: The "Elephant" Keyset and the Standard. The temperature range is between 50°-150° F. Contacts of pure silver are rated 450 W a.c. and 120 W d.c.

Air-Flow Roof Ventilators

PART of the production range of fan and ventilating equipment supplied by FENTON, BYRN AND CO. LTD., Air-Flow Works, Berrylands Road, Surbiton, Surrey, are two types of motorised roof ventilators. Adapted to fit any roof angle, these units are available in 12 in. and 16 in. sizes, ranging from 600 cfm to 2,300 cfm.

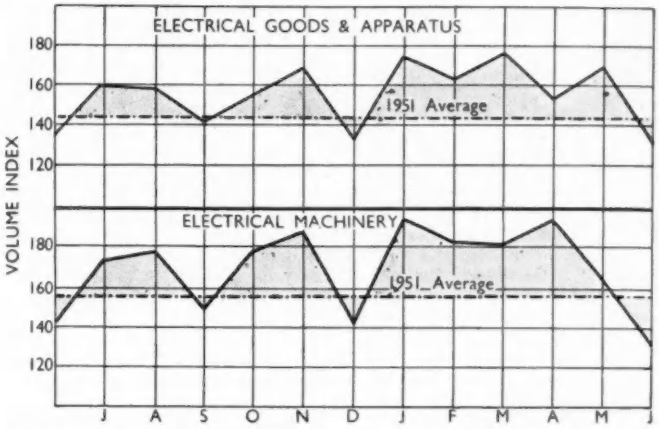
The impellers, whether intake or exhaust, are six-bladed units fabricated from aluminium. Power units are, for 12 in. light duty, shaded pole motors with sleeve bearing; for others, capacitor start and run. All are totally enclosed and continuously rated. Motors for d.c. are series wound, whilst squirrel cage induction types are used on three-phase supplies. The units are finished in acid-proof black bitumen.

TRADE PUBLICATIONS

CURRENT LIMITING REACTORS.—Issued recently by the Hackbridge and Hewittic Electric Co., Walton-on-Thames, Surrey, is Publication DB 18/1 which deals with the general design and construction of large current limiting reactors.

PHOTOGRAPHIC COPYING.—The use of mercury vapour lamps for photographic copying is now extensive. Specially designed lamp for this purpose is the range of Hewittic m-v lamps, which are described in Publication CH.1 available from the Hackbridge and Hewittic Electric Co. Ltd., Walton-on-Thames, Surrey.

EXPORTS AND IMPORTS



EXPORTS VOLUME INDEX

The continuing trade recession is reflected in the June export figures where both electrical machinery and electrical goods and apparatus are shown as well down. In the first category the drop was to a level of 134% of the 1947 volume of exports. Total value of exports in the machinery class was £3,711,761 compared with £4,766,943 in May.

Exports of electrical goods and apparatus, after their increase in May failed to hold their position and fell to 130% of the 1947 average volume. The May value, of £10,217,027, fell by £2,296,662 to £7,920,365.

EXPORTS of electrical goods during the month of June decreased considerably compared with the May total, but not quite to the extent (of 18%) which was the average reduction over the U.K. exports in general. To a great degree the decrease was due to the fact that June had only 23 working days compared with 27 in May. The restriction on imports in some countries is also reflected. For instance, the figure for electric cooking and heating appliances last month was less than 50% of the May total. Complete electrically operated washing machines, too, declined a little further to a value of £412,597 exported in June, compared with totals of £471,878 in May and £459,663 in April. Portable electric tools sent abroad in that month amounted to £104,653.

Description	Exports Value Month of June			Imports Value Month of June		
	1950 £	1951 £	1952 £	1950 £	1951 £	1952 £
Telegraph and Telephone Wires and Cables—						
Submarine	125,179	8,100	6,280	—	—	—
Other	664,937	433,391	782,238	—	—	—
Rubber Insulated	362,766	443,590	667,465	—	—	—
Insulated, other than Rubber	746,009	776,206	1,107,440	—	—	—
Wireless Apparatus, including Valves	1,387,661	1,843,947	1,582,494	182,450	339,438	337,079
Telephone and Telegraph Apparatus	1,618,895	1,188,618	1,192,114	—	—	—
Electric Lighting Appliances, Accessories, Fittings and Parts:—						
Filament Lamp Bulbs	106,196	119,665	111,068	27,437	28,438	3,671
Other Descriptions	352,757	322,563	371,617	21,723	62,511	39,956
Batteries (primary)	153,367	223,385	160,535	—	—	—
Accumulators, Portable	305,440	347,676	307,015	—	—	—
,, Stationary	50,136	42,179	113,667	—	—	—
,, Parts and Accessories	74,497	85,783	66,202	—	—	—
Electrical Cooking and Heating Appliances	274,000	419,122	236,247	—	—	—
Ammeters, Voltmeters, etc., and Parts	111,060	105,919	94,742			
House Service Meters	131,332	108,434	195,244	44,495	46,563	46,943
All Other Instruments	147,653	96,527	100,365			
Electro-Medical Apparatus	35,662	40,567	29,114	—	—	—
X-Ray Apparatus, etc.	80,919	140,481	86,209	29,856	22,833	58,973
Insulating Materials	168,200	213,162	126,463	—	—	—
All Other Articles	491,768	487,345	543,846	140,395	163,107	172,476
TOTAL OF GROUP	7,388,434	7,446,670	7,920,365	446,356	662,890	659,098
Electrical Machinery:—						
Generating Sets (Diesel)* Not exceeding 200 kW	359,622	357,883	363,671			
,, ,, ,, Exceeding 200 kW—	80,151	121,251	209,229	33,872	38,763	46,817
Other Generating Sets	413,689	330,226	63,055			
Generators minus Prime Movers, and Parts†	218,615	314,114	341,424			
Motors	675,857	762,263	777,802	90,901	30,971	39,159
Convertors, Transformers, Rectifiers, Motor Control Gear, Switchgear, other machinery	1,729,144	1,706,512	2,028,555	24,151	14,546	29,440
Fans, Electrically and Power Driven	139,842	136,437	154,480	—	—	—
Vacuum Cleaners or Electrically Operated Appliances	303,039	436,690	276,851	—	—	—
TOTAL APPLIANCES AND MACHINERY	11,308,393	11,612,046	12,135,432	595,280	747,170	774,514

* 1950 Figures include generators minus prime movers. † 1950 Figures for parts of generators only.

The WEEK in NEWS

Cuts in Permit-free Conduit Supplies

Changes made in Steel Distribution Scheme

THE Ministry of Supply last week announced a number of alterations in the Iron and Steel Distribution scheme which came into operation earlier this year. The most important change which affects the electrical industry is the reduction in the amount of electrical conduit which can be obtained without permit under the small quantities exemptions. The new amount is 3 cwt a month. Relaxations have also been made in arrangements for economising in the use of alloy steels containing nickel and molybdenum, and the list of special-purpose steels not subject to restrictions has been amended by the addition (among others) of turbine blading steels and steels prepared as a drawn wire in coil.

The relevant order which authorises these amendments is S.I.1316, the Iron and Steel Distribution (Amendment No. 2) Order. The changes became effective on Monday.

H.E. Resources in Guatemala not Fully Developed

THE recently published Overseas Economic Survey of Guatemala is rather unhelpful to the electrical manufacturer in this country. Its close proximity to the U.S. is no encouragement, but despite its size Guatemala is an important market in that it lies in the dollar area, and local industry is limited. There is no exchange control and few import restrictions. With increased purchasing power and improvement in transport, the market could expand rapidly.

Many of the country's natural resources have been by no means fully exploited, including its available hydro-electric power. Existing demand is met by a total generating capacity of 35,000 kW. There has been a steady growth in demand for increased power, and its wider use would undoubtedly assist in developing Guatemala's economy.

M.O.S. increases Secondary and Scrap Metal Prices

CONSEQUENT upon the recent increase in the selling price of virgin copper (see our July 10 issue) the Minister of Supply has made an order raising the prices of secondary copper, brass, scrap, etc. In the case of secondary copper, electrolytic ingot bars and wire bars have gone up by £6 per ton to £285 10s., and cathodes by the same amount to £284 10s. All designations of brass have increased by £3 per ton and of copper scrap by £5 per ton. All types of brass scrap have gone up by £3 per ton. The order stipulating these alterations in prices is entitled the Copper, Zinc, etc. Prices (No. 3) Order 1952, S.1.1317, and came into force on July 16.

FERRANTI WIN U.S. ARMY CONTRACT

AN order for nine 33,000 kVA power transformers valued at $1,137,605 or £406,300, has been placed by the U.S. Defence Department with Ferranti Electric Inc., a subsidiary of Ferranti Ltd. in Britain. This was announced in Washington last week. The transformers, with appropriate accessories and spare parts, are for installation at the Garrison dam project, near Bismarck, N. Dakota.

Quite apart from the size of this contract, it is significant that the order has been given to a British firm at all, in view of the "Buy American Act" which limits the purchase of foreign goods in preference to those produced in the States. Needless to say, Ferranti were not alone in submitting tenders, but the company's bid was some $200,000 (£71,420) lower than the lowest bid by an American competitor. It is understood that a U.S. Army spokesman stated that each case concerning similar contracts in the future would continue to be considered strictly on individual merits, within the limits of national policy and relevant laws and regulations.

Due to the short delivery date, we understand that work is to begin on the contract almost immediately at the company's Hollinwood factory.

The First Half-century

The stock remark of lay writers and speakers for twenty years past, that "electricity is in its infancy," shows no signs of falling into disuse, though a twenty-year-old infant sounds rather like a contradiction in terms to anyone except a lawyer repudiating a youthful client's debts. As far as authorised public supply works go the 'infant' industry can show 278 in operation, and 144 under construction, to say nothing of the 161 Provisional Orders not yet exercised, and the 15 Electric Power Bills, some of which have already attained fruition.—*From our issue of July* 24, 1902.

Distribution of Lamps in Scotland

AGREEMENT was reached earlier this week over the methods of distribution of Atlas and Ekco-Ensign lamps in Scotland. The parties concerned were the Electrical Contractors Association of Scotland, Thorn Electrical Industries, Ltd. and Ekco-Ensign, Ltd., and as a result, the rights of the electrical contractor as a legitimate distribution channel for the supply of lamps and lighting equipment to consumers in Scotland have been recognised. The parties consider that a simplification of the trading structure is in the interests of all concerned, and as an ultimate aim the manufacturers are to serve the trade, and retailers and contractors will supply the consumer.

In appreciation of the concessions made by the two companies involved, the E.C.A. of Scotland has undertaken to co-operate as closely as possible with them. All the companies' facilities as regards sales organisations, research and production resources will be made available to members of the Association, who are to seek to promote the sales of those manufacturers' lighting products. It is expected that the new arrangement will also benefit wholesalers.

MODEL FARM AT ROYAL WELSH SHOW

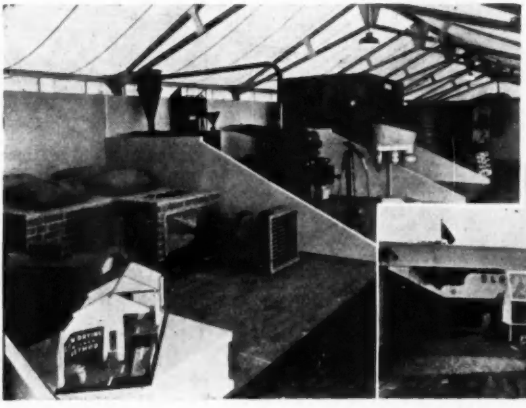
ONCE again actual farm buildings are being used to exhibit electrical equipment at the Royal West Show which opened at Caernarvon yesterday (Wednesday). The display has been organised jointly by E.D.A. and the Merseyside and N. Wales Electricity Board and is on view throughout the Show, which closes on Friday. There are seven sections in all, namely, farm machinery, pig rearing, farm workshop, dairy, poultry, water pumping and horticulture. A comprehensive selection of the most up-to-date equipment now available to farmers will be included, and much interest is likely to be shown in the workshop where running repairs to machinery can be done on the spot. Exhibited in this building are electrically driven tools and welding apparatus.

3s. RISE FOR JOINTERS

THE Joint Industrial Council of the Electrical Cable Making Industry has accepted the recommendation of its Standing Joint Committee on Plumber Jointers that the allowance to men employed in oil bays should be increased to 3s. a day as from last Monday. The provision that the allowance is for a working day of any length without any extension in respect of overtime, is maintained.

E.T.U. OPENS NEW LONDON OFFICES

THE new London area office of the Electrical Trades Union, at 39 Highbury Place, N.5, was formally opened last Thursday. In the three-storey building the ground floor comprises a board room, to accommodate 40 people at area committee meetings, the filing department, general office, telephonist's room and unemployment room. On the first floor is the office of Mr. E. Turner, area secretary, the office supervisor and the typing pool, while on the third floor are six offices for area officials. There are Reliance inter-com. units in all rooms, and at the rear of the building is parking space for cars. The electrical work was carried out by Pinchin and Walton. At the ceremony, Mr. Walter Stevens, general secretary, said that the freehold property had cost the E.T.U. £6,750, plus a further £6,000 to effect the necessary alterations and redecoration. Previously the area office had been at Swinton House, Grays Inn Road, for 12 years. Among those present at the function were Mr. T. W. Lukehurst (E.P.E.A.), Mr. H. S. Smith (B.E.A. London Division Labour Relations Officer), Mr. E. A. Mills and Mr. R. Lee, of the L.E.B. (D.J.I.C. representatives), Mr. S. Barlow, and numerous representatives of various unions.



Two photographs of the stand at the Great Yorkshire Show, held at Harrogate earlier this month, arranged jointly by the North-Eastern and Yorkshire Electricity Boards. On the left is a picture of the interior showing agricultural machinery which was displayed and demonstrated, and below a general view of the large stand

Mr. R. Gillespie Williams being greeted by the Lord Mayor of Nottingham when he visited the I.E.S. there recently. On the left is Mr. G. C. Small, immediate past-president of the Nottingham Centre, and on the right Mr. C. S. Caunt, chairman, and Mr. N. C. Slater, vice-chairman elect

I.E.S. told of Lighting in New York

WELCOME visitor at the Nottingham Centre of I.E.S. recently was a past-president of the Centre, Mr. Rollo Gillespie Williams, who has been paying a short visit to this country. During his stay he addressed a special sessional meeting.

He referred particularly to the very high intensity of illumination provided. It was customary to make extensive use of reflector spot lamps without enclosing them in any type of fitting, and where fluorescent lamps were employed the fittings became an architectural feature of the building. Mr. Williams mentioned two New York installations for which he was responsible. In the lobby of a well-known store no less than 216 kW was used in an area of under 1,000 sq ft. It was electronically controlled by daylight and the system was so elaborate that a cloud passing in front of the sun would cause the standard of illumination to vary. The installation included thousands of reflector spotlights. The second of Mr. Williams' installations was in an office and was operated by button control. Operating load was 33 kW and was such that any lighting combination could be selected at will.

It will probably be recalled that Mr. Williams was associated with W. J. Furse and Co. Ltd., before his departure to America some six years ago. He is now President of Gillespie Williams Inc., of New York, and Vice-President (Engineering) of the Color Lighting Corporation of America.

OFFICIAL PUBLICATIONS

OVERSEAS ECONOMIC SURVEY. Peru (see page 167). H.M.S.O. 3s. 6d.

IRON AND STEEL DISTRIBUTION (Amendment No. 2) ORDER, 1952. S.I. 1316. (See page 164.) H.M.S.O. 2d.

COPPER, ZINC, ETC., PRICES (No. 3) ORDER, 1952. S.I. 1317. (See page 164.) H.M.S.O. 3d.

SUPERANNUATION (Transfer between Civil Service and Public Boards) (Amendment) Rules 1952. H.M.S.O. 2d.

Midlands Board Says "Use More Electricity"

FOLLOWING recent anxiety over the decline in demand for electricity the Midlands Electricity Board's latest wall newspaper for employees invokes readers to use more electricity in the home. The newsheet measures some 23 in. by 18 in. and sets out to explain how electricity is more economical than coal in the home. It is claimed that the electrical industry is making a major contribution towards solving the national fuel shortage with the exhortation that changing to electricity saves coal.

B.R. Order Wagons for Heavy Plant

FROM time to time we have mentioned in these columns the difficulties involved in the transport of electrical machinery. Most of the transportation has had to be done by road, that being the least inconvenient, but we now note that British Railways are taking action to cope with the problem of carrying the heavy equipment needed in the extension of the electrical industry. Accordingly, they have ordered two of the largest wagons designed for use in this country.

Briefly, the trucks will be 92 ft long, will have 24 wheels and will be capable of carrying loads up to 135 tons. Traversing mechanism will be included to enable the equipment to be moved so as to avoid bridges, signals and the like. They are to be built by Head Wrightson and Co. Ltd., and are expected to be in service by the late autumn.

ELECTRICIANS STRIKE ON EAST ANGLIAN AIRFIELDS

A STRIKE of about 100 electricians engaged on maintenance work at nine airfields in East Anglia, which has now been recognised by the Electrical Trades Union, has caused a hitch in the negotiations between the National Federated Electrical Association and the E.T.U., and has thereby precluded discussion on the question of any wage increase for wiremen, etc. This latest dispute developed after the dismissal of five men, alleged to be redundant, who were engaged on electrical work at an R.A.F. station in East Anglia. The E.T.U. claimed that these men had been victimised and called out all their members employed at nine airfields by E. Dyne and Co. Ltd., the firm concerned. In view of the development, a meeting of the J.I.C. Standing Committee, scheduled for last Friday, was abandoned. The N.F.E.A. has informed the E.T.U. that negotiations on other matters cannot proceed while the strike lasts.

Stockholm Conference on Broadcasting

A CONFERENCE, the first of its kind to be held, to consider the assignment of very high frequencies for sound and television broadcasting in Europe, has completed its deliberations in Stockholm. The conference has produced an agreement with which are associated three plans for the assignment of frequencies to European stations, one for each of the three-wave bands of 41-68 megacycles per second, 87·5-100 megacycles per second and 174-216 megacycles per second. Representatives of 31 countries were present.

In the first band the conference accepted assignments which the U.K. made for the five h.p. TV stations of the B.B.C. and for the five l.p. stations planned. Development in bands 2 and 3 has yet to be decided but provisional proposals were submitted. The Stockholm plans will come into force on July 1 next, and are due for revision not later than July 1, 1957.

E.I.B.A. ANNUAL MEETING

SPEAKING at the annual meeting of E.I.B.A. last week, the president, Mr. C. R. King, again stressed the need for additional support. The Association had managed to balance its budget, he said, but only after a hard struggle. This had resulted in a diversion of energies from the main task of solving the personal problems of those in need in the industry. One of E.I.B.A.'s main tasks concerns T.B. patients, and in this respect it was reported that although there was no decline in the number of cases, there was an expensive emergency private sanatorium treatment.

ATTRACTIVE SHOWROOM LIGHTING AT BRADFORD

RECESSED reflector spotlights have become increasingly popular in recent years for display illumination, and one particularly attractive application of the method of lighting is seen in our accompanying illustration, taken at the Bradford showrooms of J. Cawthra and Co. Ltd., textile manufacturers. Indirect fluorescent lighting from fittings mounted in specially designed fibrous-plaster cornices has also been provided.

On the counters directional spotlamps have been employed to give a high-intensity illumination. The fluorescent lighting, together with a background lit by concealed coloured lamps, ensure bright and attractive showcases. The installation was planned by British Thomson-Houston engineers and carried out by Inman-Joist Ltd., of Bradford.

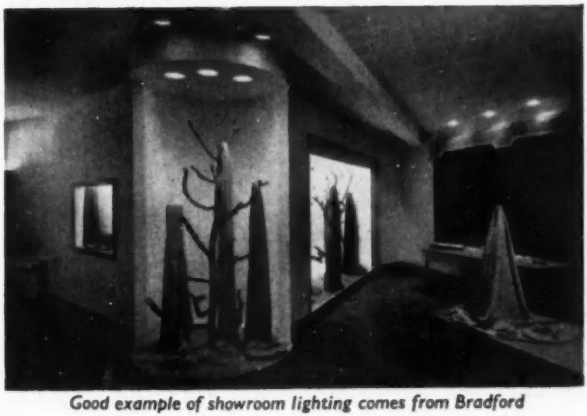
In Defence of Smallholdings

THE S. Wales Electricity Board is to be asked to abolish capital charges for electricity installations at smallholdings. This decision was taken at a recent meeting of the Glamorgan C.C. Smallholdings Committee, who will also send a second deputation to the Board. Members maintained that it was wrong that tenants of smallholdings which are situated near villages should be asked to meet capital costs for electricity. The decision was taken despite the fact that the county branch of N.F.U. will not join the deputation. The Union, it was understood, were taking action on a national basis.

GOOD PROSPECTS IN PERUVIAN MARKET

TRADE with Peru, which declined between the wars due to the import into that country of cheap German and Japanese goods, has revived in recent years. Helped by the revaluation of sterling, the U.K. has made considerable progress in the Peruvian market, and is second only to the U.S. These facts are contained in the Overseas Economic Survey of Peru, just published.

As regards electricity, its use in Peru has developed so much that existing plant is quite inadequate. New hydro-electric installations are in the course of construction and others are being planned. There are large potential h.-e. resources—a recent geological survey estimating it at 6,400,000 h.p. Growing demands led to plans being drawn up for an additional power station with a capacity of 90,000 kVA. Inauguration of the first group took place in July, 1951. A second group was scheduled to be in operation early this year. Imports of electrical goods as a whole have increased considerably, by no means least among suppliers being the U.K. Principal imports in this category include dynamos and motors, transformers, accumulators, domestic appliances, radio transmitters and receivers, lighting and heating apparatus, and cables.



Good example of showroom lighting comes from Bradford

Consultative Council to Study Procedure

IT was decided at last week's meeting of the Eastern Electricity Consultative Council that a committee should be set up to examine the working procedure of the Council. This decision followed a small discussion at last week's meeting on the recent debate in the House of Commons on Consultative Councils.

The formation of the committee was also influenced by remarks passed at this year's B.E.P.C.

Members of the Council considered that it might be an excellent idea if the workings of the body were investigated, particularly with a view to making any suggestions as to improvements. The chairman, Ald. W. J. Bennett, pointed out that the Eastern Council at least would then be prepared should any remodelling be proposed at some future date. He remarked, however, that much of the criticism which had been levelled at Consumers' Councils recently may well have been based on experience in other areas about which they knew nothing.

COUNCIL LIKE ARMY WITHOUT WEAPONS

POINTED criticism of Southern Electricity Board's new tariffs, and of their attitude to the Council, was made by the deputy chairman, Ald. E. W. B. Gill, at the Area's Consultative Council's recent meeting. His main objection to the new charges was that no allowance had been made for small three-roomed houses. The council, he said, had failed to obtain a concession for a minimum rate for those dwellings instead of the present minimum of four.

Ald. Gill took the opportunity to query the effectiveness of the Council. He said it might be a good idea to discuss whether the Council served any useful purpose at all, because when any proposal was made they were met with fair words and nothing more. It was, he said, like an army without any weapons, as it was becoming increasingly difficult to get the Board to take any action suggested to them.

GAS TURBINE TESTS

PARSONS RECEIVE ORDER

WE learn that C. A. Parsons and Co., Ltd., have begun tests on the 15,000 kW gas turbine for Dunston. At the same time the manufacture of a 2,500 kW gas turbine driven alternator, which will all undergo prolonged tests, is in an advanced stage. Following experiments of a gas turbine operating on pulverised coal the company has recently received an order from the Ministry of Fuel and Power for a main line gear drive gas turbine locomotive to operate on pulverised coal. The main frame, carriage and running gear will be built by the North British Locomotive Co., Ltd.

NEWS IN BRIEF

We hear that the Toxteth Technical Institute is to be known as the Riversdale Technical College and will be moved to Riversdale Rd., Aigburth, Liverpool 19. The change becomes effective as from September 1 next. Principal of the college is Mr. A. R. Kinsman.

Full-time three-year courses for radio technicians have been organised by the Ministry of Education and will start in September at five centres in London, the Midlands and the North.

Eighth annual sports meeting of Telcon took place at Kidbrooke on July 5. Prizes were presented by Lord Colgrain, chairman.

A contract to provide equipment for a TV service in Venezuela, totalling about £100,000 was signed last week. Marconi's Wireless Telegraph Co. will design, make and install the equipment.

Family visits to the Witton works of the G.E.C. first introduced in 1949, are now popular annual events. This year between nine and ten thousand toured the numerous workshops and laboratories on the estate.

About 5,000 attended the annual gala day of the Athletic and Social Club of B.I.C.C. Ltd. Opening ceremony was by Jon Pertwee, who arrived dramatically by helicopter.

Hoover Sports and Social Club held their gala sports day at Sudbury Ave., Wembley, recently. Apart from athletics there was a horticultural show, a fair, jeep assembly competition by Army units, and other attractions.

There were 40 events on the programme at Johnson and Phillips' annual sports and gala held recently. About 1,200 employees and friends enjoyed the day's entertainments.

The Plessey Group of Companies recently entertained delegates to the British Commonwealth Signals Officers' Conference to dinner at Grosvenor House, London. Our picture shows, from left to right, Mr. T. White Wilson, executive director of Plessey Co., Ltd., and director of Plessey International Ltd.; Brig. Akehurst, director of Signals, Army H.Q., New Delhi; Mr. B. G. W. Attwood, director of Plessey and Plessey International; and Maj. Gen. Bowen, director of Signals, War Office

Questions in Parliament . . .

Electricity Consumption

Replying to a query on the cause of lower consumption of electricity during the first half of this year, Mr. G. Lloyd said it was not possible to measure the separate effects of different factors. Mr. G. Nabarro had asked to what extent the diminished rate of increase in consumption was due respectively to mild weather, less industrial demand, lighting, scrapping of trams or other causes. He also asked if the lesser use of space- and water-heaters and cookers had contributed appreciably to such diminution.

Relay Wireless and TV Stations

Mr. David Gammans answered questions on television last Friday, which were relevant to the link-up between this country and France. The recent project, he said, was decided on at a meeting between representatives of the two countries in November last year. Provision of a TV station at Pontop Pike would involve substantial capital expenditure whereas the link with France consisting of two temporary relay points was set up by means of mobile equipment normally used for outside broadcasts. He was asked by Miss Ward on what grounds the cost of the Pontop Pike station was disclosed and the cost of the south coast stations withheld.

Representations on Tariffs

In a written answer last week, the Minister of Fuel and Power stated he had received no representations from consultative councils concerning inequalities in the application of new tariffs.

Gloucester Service Centre

At question time last week Mr. G. Lloyd said the examination of the facts concerning the building of Gloucester's new service centre was not yet completed and therefore he could not say what action he proposed to take.

District Heating

Mr. G. Lloyd said last week that his Department was represented on the Committee on District Heating set up by the Minister of Housing.

Steel for H.E. Board

Sir D. Robertson asked on Thursday about the cut in steel allocation to the N. of Scotland H.E. Board for the third period of this year which would put construction back for one year and delay distribution to Lewis, Perthshire, Angus, Caithness, Kyle, Kintyre and Aberdeenshire. This it was stated would deprive over 5,000 farms of electricity. Questioned as to what remedy would be instituted in the next allocation period, the Secretary of State for Scotland said the general shortage of steel was to blame and the inability to meet the Board's demand would delay the programme. Demands for the ensuing period would be given every consideration along with other claims.

Meter Examinations

Asked about work done by electricity meter examiners during 1951, Mr. G. Lloyd said on Monday that during the year ending last March 2,112,495 meters were submitted for examination and certification. About 100,000 sample meters were tested, 733 being found faulty: as a result 6,822 of the meters submitted were rejected. Also 576 defective items of testing apparatus were dealt with. Sixteen disputed meters were referred to the meter examiners and two were found faulty. The Minister also stated there were seven area meter examiners with 20 meter examiners working under them. Their duties were mainly threefold: Namely, to examine and certify meters submitted to them by the electricity boards, to make certain that meter testing instruments provided by the boards were properly maintained, and to adjudicate in disputes between consumers and boards referred to them for settlement.

Electric Supply News . . .

Brighton

Despite difficulties caused by the present severe shortage of steel, progress at Brighton "B" power station was being well maintained. This was emphasised by the Regional Director for Fuel and Power, Mr. R. G. Thatcher, in a statement he made to the Sussex County District Advisory Committee for Industry at its meeting recently.

Eastern

Consumers connected by the Eastern Electricity Board during the month of May amounted to 2,704, compared with 2,941 during April, the area consultative council were told at their meeting last Friday. The sub-areas with the highest individual totals were: in May, Northmet with 839, and in April, Essex with 838. Mains extensions by the Board during those months totalled 46·2 miles of h.v. and 23·5 miles of l.v. in May, and 19·3 miles of h.v. and 25·2 miles of l.v. in April.

Eire

Ireland's electricity output will be more than doubled under a five-year £22,000,000 development programme announced by the Electricity Supply Board. By 1957, over 371 MW of plant —120 MW more than the present capacity—will have been installed, to give an overall output

increase of 248%, of which 33% will come from peat-fired generating stations. The new generating stations will include three peat-fired, two hydro, one oil-fired and two fired by coal or oil. When this programme is completed more than 75% of the water power of the Republic will have been utilised. The electrification of rural areas is to continue to receive special priority in order to foster the further decentralisation of new industries and to make possible the improvement of domestic and social conditions in isolated villages.

Fife

The plan of the Fife County Council to generate electricity at the reservoir they are building at Upper Glendevon has come up against a hitch. Differences of opinion have arisen with the North of Scotland Hydro-Electric Board over some of the financial aspects of the scheme and the plant involved, it is stated. The County Water Supplies Committee has put the estimated annual expenditure on the scheme at £2,200. It was anticipated that 1½ million units could be generated annually, which the Board would purchase at ¼d. per unit, providing a profit of £925 a year.

Huncoat

The B.E.A. has received the consent of the Minister of Fuel and Power to the extension of the Huncoat power station, Accrington, by the installation of a fifth 30 MW turbo-generator. This station was originally designed to house four 30 MW sets, the first of which went into operation last month.

Lleyn

The Rural Council last week, for the second time, decided to leave on the table letters from three Aberdaron residents and another from a visitor from Birmingham protesting against the council's support of a scheme by the British Electricity Authority to erect an electric wind generating station on Mynydd Anelog, Aberdaron. The letters maintained that the scheme would be detrimental to the amenity of the district and would thus affect the tourist industry as well as cause loss of common grazing land. The council expressed an opinion that the scheme would benefit the district.

Lockerbie

Because more than 80% of the tenants of Lockerbie's new housing scheme at Sydney Place chose electricity in preference to gas, the town council has decided to withdraw the right to choose, and now the houses will be all-electric. The contract with the Scottish Gas Board for the laying of gas mains is to be cancelled.

North-Eastern

At a meeting at Newcastle-on-Tyne of the North-Eastern Electricity Consultative Council, it was reported that during the three months March, April and May, 80 substations had been put into operation. These included 24 in the Tyne area; 9 in the Wear area; 13 in the Tees area; 19 in the York area; and 15 in the Harrogate area. In the same period 90 farms were connected compared with 98 in the corresponding period of last year. During the quarter the North-Eastern Electricity Board approved estimates amounting to £1,134,512 in connection with electrical work for 79 housing schemes and 35 rural supply schemes. The Board has been in touch with the National Coal Board regarding the transfer to them of networks under the control of the N.C.B. Agreement has been reached for the transfer of the supplies at Lynemouth, Linton, Ellington Colliery, Ellington Village and Cresswell (in the Tyne sub-area). Following the approval of the estimates covering the cost of the transfer, orders for materials have been placed and other preliminary work started. The report stated that surveys had been made regarding the transfer also at Woodhorn Grange, Ellington East and West Moor Farms (Tyne sub-area), and Cornsay, East Herrington and Middle Herrington in the Wear sub-area.

North-Western

The 15 MW gas turbine set at Trafford power station, Manchester, is expected to start operating soon, Mr. A. R. Cooper, divisional controller for the North-Western Division of the B.E.A., stated last week. Among new plants being brought into commission in the division before the winter peak is a 30 MW turbo-generator at Westwood power station, a 40 MW set at Blackburn and a 50 MW unit at Bromborough where there is a possibility of another similar set being installed this winter, while the first 80 MW set at Huncoat has already started operating.

Sutton-in-Ashfield

At the recent meeting of the U.D.C. a suggestion by the East Midlands Electricity Board for a supply of electricity to the Carsic-lane new housing estate by overhead line, instead of by underground cable, because of the serious scarcity of material, was described by the chairman as a very retrograde step. It was decided to urge the Board to provide underground cable in order to preserve the amenities of the new estate.

LIGHTING SCHEMES

Dagenham.—T.C. is seeking Ministry's approval to amended scheme for improved lighting in Oxlow Lane, Beverley Road, Hedgemans Road and Bennetts Castle Lane, at a cost of £7,000.

Darlington.—The borough engineer, Mr. G. S. Short, is preparing schemes for improving lighting in Haughton Road and North Road, utilising sodium lamps.

Nottingham.—After protracted negotiations with the M.o.T., the lighting committee has received approval for completion of the improved lighting of Valley Road from Radford Road to Mansfield Road. Approval has also been received for the improved lighting of Clifton Boulevard and of Derby Road from Middleton Boulevard to the city boundary.

Seaham.—U.D. Finance Committee is discussing with the North Eastern Electricity Board a £2,556 plan for improving street lighting.

Company Activities . . .

Cables Investment Trust

Profit for the year ended June 30 last is £215,330 (*£196,777*), after charging taxation of £193,603 (*£166,014*). The final Ordinary dividend is 6% (*3%*), making 8% (*5%*).

Electrical Components Ltd.

For the year ended March 31 the total group profit, before taxation, is £141,372 (*£140,376*). Exceptional income amounts to £1,756 (*£5,861*). The final dividend is 12½%, making 20% (*same*). To taxation provisions £90,987 (*£86,665*), dividends absorb £19,309 (*£18,524*), and the balance retained as reserves is £32,832 (*£41,048*).

Globe Telegraph and Trust

Profit for the year to June 30 is £204,537 (*£170,485*). The balance is struck after charging taxation of £183,455 (*£144,476*). The final Ordinary dividend is 5% (4½%), making a total of 8% (7%).

Murex Ltd.

Consolidated group profit for the year to April 30 last is £659,000 (*£759,000*), after providing £948,000 (*£890,000*) to cover the year's estimated taxation liabilities. The final Ordinary dividend is 9% (7½%), making 15% (*12½%*). In the directors' statement, it is disclosed that the fortuitous element contained in the profit which arose in the earlier months of the year from the turnover of stocks purchased at prices below replacement cost, though substantial, was less marked than in the previous financial year. Disregarding the fortuitous element, there was a satisfactory increase in the year's trading profit.

Nigerian Electricity Supply Corporation

The net profit for the year ended February 29 last is £119,593 (*£112,572*), before charging taxation of £67,529 (*£55,500*). To plant replacement reserve £20,000 (*£25,000 to general reserve*). The final dividend is 4%, plus bonus 2%, again making 10%.

Richardsons, Westgarth and Co.

The net profit for the year to March 31 last is £247,361, compared with £240,851 for the previous period, according to the preliminary statement. Taxation amounting to £479,470 (*£356,900*) is charged. The dividend is again 12%.

Reliance-Clifton Cables & Industrial Products

It was only recently that the effect of the cuts in production of goods for home consumption had been felt, stated Mr. Arthur Collins, chairman, at this meeting last Friday. Sales were in advance of the corresponding period of 1951, and if there was no marked deterioration in trading conditions there should be another set of satisfactory accounts for shareholders in due course, he added. Important development contracts for the Admiralty, Air Ministry and Department of Atomic Research were in an advanced stage and offered promise for the future. Whilst the company remained fully occupied, the seller's market was very definitely at an end, with a resultant thinning of order books and a very marked increase in competition, Mr. Collins said.

Ruston and Hornsby

The preliminary statement shows a group net profit of £898,301 for the year ended March 31 last, compared with £746,975 for the previous year. The Ordinary dividend is increased by 2% to 11%. The profit figure is struck after charging U.K. taxation of £1,299,585 (*£1,040,407*), depreciation £328,508 (*£280,283*), plant replacement £120,000 (*same*), debenture interest £15,702 (*£15,750*). Retained in accounts of subsidiaries is £161,604 (*£95,797*), leaving the net profit to Ruston and Hornsby of £736,697 (*£651,178*). With £217,560 (*£194,617*) brought in, there is £954,257 (*£845,795*) available. To general reserve £457,957 (*£421,879*), Preference dividend £12,338 (*£12,631*), and Ordinary dividend absorbs £236,775 (*£193,725*), leaving £247,187 (*£217,560*) carried forward.

Scottish Cables, Ltd.

The full accounts for the year to April 30 last show current assets listed at £1,234,220 (*£1,033,101*), of which stocks and work-in-progress account for £551,954 (*£501,398*). Current liabilities total £357,231 (*£413,722*), including sundry creditors at £257,983 (*£317,572*). In his accompanying statement, Mr. William Fraser, chairman, says that in the home business, the contracts and orders executed during the year were considerably in excess of the previous year. A new record was also achieved for export business during the 12 months. There had been a noticeable improvement in the raw materials position, and he was of the opinion that this would probably be maintained during the current year. The associated company, Scottish Cables (South Africa), Ltd., in its first year, ended June 30, 1951, earned an encouraging profit, permitting the payment of a dividend and the placing of a substantial sum to reserve.

Siemens Brothers & Co.

In respect of the issue of 1,225,000 Ordinary shares to stockholders, applications in respect of Rights amounted to 1,106,387, and for excess applications 498,970 shares. Applications up to 250 shares were allotted in full, but those for larger amounts were considerably scaled down.

Dividend Declared

Serck Radiators.—Interim of 5% (*same*).

Commercial Information

CONTRACTS OPEN

HOME

July 25.—Lancashire. Electrical installation at Lakeside Hospital, Ashton-under-Lyne, and Broughton-in-Furness Keppledray Residential Special School. Applications by above date to County Architect, County Hall, Preston. Deposit £2 for each job.

July 26.—Bourne (Lincs) U.D.C. Wiring and installation of electricity in 185 dwellings. Surveyor, North St.

July 26.—St. Neots U.D.C. Supply and erection of eight concrete columns with lanterns and 100 W tungsten lamps, wiring, etc., on Huntingdon Rd. Estate. Council's Surveyor, Council Offices, Huntingdon St., St. Neots. (See July 10 issue.)

July 28.—Hastings T.C. Electrical installation at Tivoli Primary School. Borough Engineer, 37 Wellington Sq. Deposit £2 2s. (See July 3 issue.)

July 28.—N. Ireland. Electrical installation in 126 dwellings at Rathcoole for N.I. Housing Trust. Trust offices are at 12 Hope St., Belfast.

July 28.—Torquay T.C. Electrical installations for 111 houses and 36 flats on Sherwell Valley estate. Borough Surveyor, Town Hall. Deposit £2 2s.

July 29.—Bangor. Lighting and heating installations in annexe of "Avoca," Princetown Rd., for Board of Governors of Collegiate School. A. N. Irens, consulting engineer, Bennett Bldg., 46 Donegall St., Belfast. Deposit £1 1s.

July 29.—Esher U.D.C. Installation of Class "A" street lighting over 1¾ miles of Portsmouth Rd., including concrete columns, lanterns, 140 W sodium lamps, control gear, fuses, etc., Engineer and Surveyor, Council Offices. Deposit £1 1s.

July 29.—Maidstone T.C. Electrical installation in 44 houses on Shepway estate. Borough Surveyor, Palace Ave.

July 29.—Manchester. Supply of 11 electrically heated drying airing cabinets and 8 cold storage cabinets for day nurseries. City Architect, Town Hall.

July 30.—Kincardine. Electrical work for erection of 44 houses at Banchory. County Architect, 34 Market Sq., Stonehaven.

July 31.—Cheshire. Names of contractors for electrical installation work required by County Council. Application for forms should be made to E. Mainwaring Parkes, County Architect, by above date.

July 31.—Edinburgh. Power and light installation at wash-house in South Grays' Close. City Architect, City Chambers.

July 31.—Stoke-on-Trent. Electric lamps included in list of supplies required for six months ending Mar. 31, 1953. City Surveyor, Town Hall.

Aug. 1.—Belfast. Supply and erection of (*a*) three-phase l.v. high rupturing capacity switchgear, and (*b*) carbon dioxide fire extinguishing equipments for substations. Electricity Dept., E. Bridge St. (See July 10 issue.)

Aug. 1.—Belfast. Supply of (*a*) 3-phase l.t. oil-immersed circuit-breaker (Spec. No. G.174a), and (*b*) portable electric hoist (Spec. No. G.178). Electricity Dept., E. Bridge St. (See July 10 issue.)

Aug. 5.—Dublin. Electrical installations at Dublin Regional Sanatorium, Blanchardstown, being built. Documents from P. D. Cinneide, Dept. of Health, Custom House. Deposit £20.

Aug. 5.—Keynsham U.D.C. Electrical installation in 48 houses on Park Rd. estate. Engineer and Surveyor, Council Offices, Keynsham, Bristol. Deposit £2 2s.

Aug. 7.—Belfast. Electrical installation of assembly hall, servery, etc., at Mount Vernon Special School. Education Architect, 49 Academy St.

Aug. 7.—Co. Down. Electrical installation at Ballynahinch Primary School. Documents from J. R. W. Murland, 13 Wellington Place, Belfast. Deposit £5 5s.

Aug. 7.—Strabane R.D.C. One electric sludge pump and equipment for Sion Mills sewerage scheme. Consulting Engineers, Croasdaile and Taggart, 36-38 Castle Arcade Bldgs., Belfast.

Aug. 8.—Bury T.C. Supply and erection of Enfield suspension lighting systems in Transport Depot, George St., and in the Rochdale Rd. garage. Borough Engineer, Town Hall, Deposit £2 2s.

Aug. 8.—Stepney B.C. Installation of power and lighting points in 124 dwellings in Cornwall St. area. Borough Engineer and Surveyor, Municipal Offices, 227-33 Commercial Rd., E.1. Deposit £5. (See July 17 issue.)

Aug. 8.—Waterford. Public Assistance Board invites tenders for installation of internal communication in County Hospital, Waterford, County Home and District Hospital, Dungarvan, and the Fever Hospital, Waterford. Edward R. Ryan, Consulting Engineer, 1 Montpellier Ter., Galway. Deposit £5 5s.

Aug. 11.—Leeds. Supply of 60 side- and one top-entry totally enclosed 140 W sodium lanterns with control gear. Town Clerk, Room 57, Civic Hall. (Advertised in this issue.)

Aug. 16.—Ceiriog (Denbigh) R.D.C. Electrical installation in (*a*) six houses at Penybont, and (*b*) four at Pandy. R. W. Aubrey, surveyor, The Mount, Chirk. Deposit £1 1s.

Aug. 16.—Selkirk. Electrical work in erection of 18 houses on Bannerfield site. Town Clerk, Municipal Buildings.

Sept. 3.—Greenwich B.C. Tenders invited for electric street lighting schemes under Contract No. 1: removal of 367 h.p. gas columns and adaptation and re-erection of 233 columns, and adaptation *in situ* of 141 columns; and under Contract No. 2: provision of bracket arms, lanterns, control gear and wiring to 374 columns and 2 suspended lanterns. Borough Engineer and Surveyor, Town Hall, S.E.10. Deposit £2 2s. (Advertised in this issue.)

Sept. 12.—Kendal T.C. Provision and installation of 72 mercury vapour lighting units and 7 fluorescent units, in Group A, including concrete columns and auxiliary equipment, wiring and along Windermere Rd. Borough Engineer and Surveyor, Municipal Offices, Lowther St. (Advertised in this issue.)

No date stated.—Midlothian. Electrical work in erection of 12 houses at Stow. Documents from County Architect, 32 Palmerston Place, Edinburgh.

OVERSEAS

*Details of items marked * may be obtained on application to the Board of Trade, Horse Guards Avenue, S.W.1, quoting reference.*

Aug. 4.—New Zealand. Supply of 15,000 yd. of 3-core paper insulated cable with shaped conductors for use on 6,600 V 3-phase 50 c/s system with unearthed neutral, for Auckland Electric Power Board, Queen St. B.o.T. (Ref. CRE 24249/52).*

Aug. 6.—South Africa. Stores Dept. of S. African Railways requires supply of two 3-phase 50 c/s 400 kVA indoor type power transformers for Walvis Bay power station. Chief Stores Superintendent, P.O. Box 8617, Johannesburg. B.o.T. (Ref. CRE 24669/52).*

Aug. 8.—Uruguay. Administracion Nacional de Combustibles, Alcohol y Portland, invites tenders for supply of total of 8,500 lamps of between 1,000 W and 40 W, and 300 fluorescent tubes of 40 W. B.o.T. (Ref. CRE 24740/52).*

Aug. 14.—Pakistan. Supply of two 7-h.p. d.c. series-wound motors, 440 V, 750 r.p.m., for overhead cranes, for Department of Supply and Development, Government of Pakistan. B.o.T. (Ref. CRE 24848/52).*

Aug. 15.—South Africa. Municipality of Mariental want an oil engine driven 100 kW generator with switchboard, etc. Town Clerk, P.O. Box 110, Mariental, or consulting engineer, H. Muller, P.O. Box 53, Kakamas.

Aug. 20.—New Zealand. Dunedin Electricity Dept. requires two 3-phase lightning arresters for connection to outdoor 33 kV bus, to protect two 33 kV/11 kV 3 MVA delta/star transformers and switchgear at Port Chalmers and Mosgiel substations. B.o.T. (Ref. CRE 23931/52).* Also for supply of 33 kV control panels for the same substations. B.o.T. (Ref. CRE 23879/52).* Same concern also invites tenders by same date for supply of 33 kV switchgear for Halfway Bush substation. B.o.T. (Ref. CRE 23878/52).*

Aug. 29.—India. Bombay Electric Supply and Transport Undertaking invites tenders for supply of 8,000 kVA, 22,000, 6,500 V 3-phase, 50 c/s transformer, with automatic on load voltage regulating gear, and accessories. The Undertaking is at Electric House, Fort Bombay 1. B.o.T. (Ref. CRE 24787/52).*

Sept. 1.—Uruguay. Supply of 35,000 kilos of insulating paste for underground armoured electric cable junction boxes for Usinas Electricas y Telefonos del Estado. B.o.T. (Ref. CRE 24815/52).*

Sept. 2.—Australia. Manufacture, supply, installation and testing of electrically driven centrifugal pumping plant comprising three pumping units, control equipment, cables, pipes, etc. Commissioner for Irrigation and Water Supply, William and Margaret Sts., Brisbane.

Sept. 2.—India. Supply, erection and testing of two 2,800 h.p. 2,000 kW turbo-generating sets, two 2,500 kVA 11/33 step-up transformers, one indoor type, remote controlled 11 kV switchgear, one 33 kV outdoor type switchgear, protection and controlling equipment, medium and low voltage a.c. equipment for operation of 400/230 V 50 c/s 3-phase 4-wire system and medium and low voltage d.c. equipment for 110 V system. Chief Engineer, Electricity Development, Govt. of West Bengal, 4 Hastings St., Calcutta.

Sept. 2.—Uruguay. Tenders invited by Usinas Electricas y Telefonos del Estado for supply of 80,550 metres of lead-covered conductors to be used under normal tension of 220 V. B.o.T. (Ref. CRE 24852/52).*

Sept. 9.—South Africa. Supply and erection of circulating water pumps and pump-house equipment, and supply of circulating water valves for Bloemfontein's new power station. Consulting Engineers, Merz and McClellan (South Africa), 1419 Escom House, Rissik St., Johannesburg. Deposit £2 2s.

Oct. 8.—Australia. Manufacture and maintenance of 132 kV and 66 kV outdoor isolated air break switches for State Electricity Commission of Queensland, Scottish Union House, Eagle St., Brisbane, on behalf of Cairns Regional Electricity Board. B.o.T. (Ref. CRE 23333/52).*

CONTRACTS PLACED

Blackburn T.C. Electrical installation at Lammack primary infants' school, Firth Bros. (Morecambe) Ltd.

Chester. Lighting of Liverpool Rd. with 42 500 W tungsten lamps, Merseyside and N. Wales Electricity Board, £2,145.

Hendon T C. Electrical installation in 101 houses and 12 flats in Broadlands Ave., Norwest Services, Ltd., £2,972.

Your Queries — Answered

"E.M.I." fans, agents for? S.B.—Hogan and Wardrop, 47 Caledonian Road, N.1. (23464)

"Thor" drills, agents for? W.—Independent Pneumatic Tool Co., 40 Broadway, Westminster, S.W. (23465)

"Peak" refrigerators, makers of?—Peak Engineering Co., New Street, Old Town, Stratford-on-Avon. (23468)

Electric pokers, makers of? H.E.—Sarum Electric Ltd., 68 Brown Street, Salisbury; Storr Supplies Ltd., Balham Road, Edmonton, N.9. (23471)

Charlton Electrical Appliances Ltd., address of? I.M.K.—This concern went into liquidation in 1949, when joint liquidators were appointed. We have no record of any other concern taking over the business. (23472)

"Simplex" sausage machine, makers of? W.F.C.—John Gardner and Son., Smithfield Works, Bradford Street, Birmingham. (23475)

"Pillar" immersion heaters, makers of? R.P.—Campbell Engineering Co., Sherman Works, Sherman Road, Bromley, Kent. (23476)

"M" thermostat, makers of? L.B.—Robert Maclaren and Co. Ltd., Eglinton Works, Kilbirnie Street, Glasgow. (23480)

The above are selected from questions we have answered this week. If you have a query, send it to us.

Kensington B.C. Supply of 150 K.P.G. time switches, Horstmann Gear Co., Ltd., £1,001.

Newcastle-on-Tyne. Electrical work in alteration to Walkergate Infectious Diseases Hospitals, G. B. Carnegie and Co., Ltd., £974.

Spenborough (Yorks) U.D.C. Supply and erection of class B sodium lighting on Leeds and Whitehall Rd., and on Leeds and Elland County Rd., General Electric Co., Ltd., £1,489.

PRICES OF CABLE METALS AND OTHER MATERIALS
(at Tuesday night)

	£ s. d.	New York price
COPPER, electrolytic	287 0 0	—
LEAD, good soft pig (foreign)	131 0 0	128 0 0
.. .. .. "English" quality ...	132 10 0	
Tin (99·99·76%) ... ...(Cash)	965-966	—
.. (3 months)	963½-964	—
ALUMINIUM, commercial purity (del.)	157 0 0	—
ZINC	130 0 0	120 0 0
ARMOURING:		
Galv. Steel Wire (0.104 in.) ...	55 0 0	—
Mild Steel Tape (0.04 in.)	39 15 0	—

GAZETTE ANNOUNCEMENTS

COMPANIES ACTS

H. J. Cornall and Co. Ltd., electrical engineers of Newcastle, Staffs. Meetings of creditors and contributories will be held at Official Receivers' Office, 12 Lonsdale St., Stoke, on July 26 at 11 a.m. and 11.30 a.m. respectively.

Gamma Electronics Ltd. Petition for winding up presented on July 15 and directed to be heard at Royal Courts of Justice, Strand, on July 28. Interested persons should communicate with M. G. Whittome, solicitor, City Gate House, Finsbury Sq., E.C.2.

Horace Guest Ltd., electrical engineers of Ampthill, Beds. Meetings of creditors and contributories will be held at Room 401, Inveresk House, Strand, London, on July 30, at 2.30 p.m. and 3 p.m. resp.

Leigh Electric Co. Ltd. Meetings of members and creditors will be held at 70 Victoria Road North, Southsea, on Aug. 22 at 4.30 p.m. and 5 p.m. resp.

P. Lubelsky and Co. Partnership between Philip Lubelsky and Leonard Lubelsky, retailers of electrical fittings and appliances, of 73 Wentworth St., E.1., dissolved as from July 10. Debts received and paid by P. Lubelsky who will continue business.

Refrigeration Specialists Ltd. Meeting of creditors will take place at St. Mary's Chambers, St. Mary's Gate, Derby, on August 1 at 11.30 a.m.

Sunbeam Domestic Appliances Ltd. Resolution for voluntary winding-up passed at meeting on July 15, when A. K. Lee of Holly Lodge, Brighton Road, near Kingswood, Surrey, was appointed liquidator.

Voluntary Liquidation

Horace Dibben Ltd., Upper Banister Street, Southampton, radio and electrical factors. At recent statutory meeting of creditors statement of affairs submitted showing liabilities of £12,341, of which £10,253 was due to trade creditors, and £2,088 to loan creditors. Assets were estimated to produce £22,688 and after allowing £6,321 for preferential claims there were net assets of £16,367, or surplus of assets over liabilities as regarded creditors of £4,026. Issued share capital was £5,000 and, so far as the contributories were concerned, there was a deficiency of £974. Principal assets were: freehold premises, fixtures and fittings £5,400; good book debts £2,910; and loan to a director £11,448. After discussion creditors resolved to confirm voluntary liquidation with Mr. Norman Osborne, of Rushton, Osborne and Co., accountants, 11 Finsbury Square, London E.C., as liquidator, with committee of inspection.

W. Simmons and Co. (Stratford) Ltd., 8 Frederick Street, E.15, electricians, etc. Meeting of creditors held recently, when approximate statement of affairs was presented showing unsecured liabilities of £9,495, of which £4,813 was due to sundry creditors and £4,682 to parent company. Assets were estimated to realise £2,503 and, after allowing £473 due to preferential creditors, there were net assets of £2,030, or deficiency as regarded unsecured creditors of £7,465. After discussion it was resolved to confirm voluntary liquidation with Mr. R. Langdon Davis, C.A., of Saker and Davis, 58 Theobalds Road, W.C.1, as liquidator, with a committee of inspection.

Receiving Order

Boston. Leslie J. Anthony trading in partnership as Dolphin Electric Co. at 6 Dolphin Lane, Boston. Date of receiving order, July 11.

Dividends

Scarborough. Samuel H. Ireland and Vincent Thomason, trading as Ireland, Thomason and Co., electrical contractors at 61 Market Place, Malton, and 110 Willowgate, Pickering. First and final dividends of 4s. 10d. in £ payable at 3 Alfred St., Leeds, on Aug. 6.

Intended Dividends

Leeds. Ronald S. Lees, trading as R. S. Lees and Co., electrical factor at 21 Cledhow Park Rd., Leeds. Last day for receiving proofs, July 30. Trustee is W. H. Meredith, Official Receiver, 29 East Parade, Leeds.

Wigan. John Bannister, electrical contractor, trading at 2 The Wiend, Wigan. Last day for receiving proofs, July 29. Trustee is A. T. Eaves, 47 Mosley St., Manchester.

TRADE MARKS

This information is extracted from the Official Journal by permission of the Controller.

Atlas. 693,058. Class 7. Ironing, washing, wringing, drying, peeling and mixing machines, etc. 690,427. Class 9. Irons, kettles, coffee percolators, vacuum cleaners, etc. 690,428. Class 11. Heating, hair-drying apparatus, etc. Thorn Electrical Industries Ltd., 105/109 Judd St., W.C.1.

Caslode. 705,039. Class 17. Electrical insulating material and parts made therefrom. Plessey Co. Ltd., 56 Vicarage Lane, Ilford.

Jifex. 706,878. Class 9. Vacuum cleaners. Water softener and Vacuum Cleaner Service Ltd., 248 Romford Rd., E.7.

"Mecklow". 706,664. Class 9. Insulated connectors for use in joining lengths of electric welding cable. Archibald Low and Sons Ltd., 82 Merkland St., Partick, Glasgow W.1.

BUSINESS PROSPECTS

HOME

Aldridge (Staffs) U.D.C. Erection of 62 houses in Redhouse Lane. H. S. Onions, engineer and surveyor, Council Offices, Daw End, Rushall.

Armagh. Approval granted for electricity extensions to houses at Annvale, Keady, Maghery, Cook's Mill and Tullyvallen.

Bognor Regis U.D.C. Tenders to be invited shortly for erection of 154 houses on S. Bersted site, and E. Morley Smith, quantity surveyors, Arcade Chambers, have been appointed for erection of 28 houses on same site.

Bridgwater T.C. Total of 44 houses to be built on three sites.

Bristol. Docks Committee has decided to improve lighting on wharves, quays and railway sidings at Avonmouth.

Bromley T.C. Construction of eight shops and 30 bungalows for old people on Hayes Place estate. Borough Engineer, Municipal Offices.

Burnham-on-Sea (Som.) U.D.C. It is proposed to build 120 houses with shops at Highbridge.

Burton-on-Trent T.C. Construction of 32 flats near Balfour St. Borough Surveyor, Town Hall.

Cambridgeshire. Revised plans approved for first instalment of extensions at Technical College. Estimated cost £21,800.

Castle Donington (Leic.) R.D.C. proposes to build 120 houses in Park Lane.

Clitheroe T.C. It is planned to build 345 houses, 35 bungalows, and six shops at Henthorn.

Daventry R.D.C. Twenty-four houses to be built at Newnham, Braunston and Byfield, and further 20 houses on five sites.

Dorking U.D.C. Sketch plans approved for 500 houses at Goodwyns Farm and 50 houses on Longmeadow site, Westcott.

Dukinfield T.C. Erection of 34 houses on Yew Tree Lane site. Architects are Cruickshank and Seward, 16 Princess St., Manchester.

Durham C.C. proposes to rebuild all but two of the county's 24 fire stations at an estimated cost of £700,000.

East Grinstead U.D.C. Construction of 60 houses on Blackwell Farm estate. B. J. Cornelius, Surveyor to Council, East Court.

Essex. C.C. is to build fire stations at Dunmow, Thaxted, Cold Norton and Newport.

Eston (Yorks) U.D.C. Plans approved for erection of 176 houses on Redcar Rd. East site.

Falkirk T.C. Dean of Guild Court has approved erection of 52 houses in Bantaskine St., and 51 in Windsor Rd.

Farnborough (Hants) U.D.C. Approval sought for erection of 250 houses and flats on Fox Lane site, Hawley.

Glasgow. Dean of Guild Court has approved erection of 1,283 houses including 165 flats at Garthamlock, and 838 houses at Drumchapel.

Gloucestershire. Erection of new county school on Arle Estate, Cheltenham. County Architect, Shire Hall, Gloucester.

Golborne U.D.C. Construction of 28 houses at Glazebury. J. B. Hoyle, Engineer and Surveyor, Council Offices, Lowton.

Hastings T.C. Erection of 102 houses and five blocks of flats on Harley Shute estate, St. Leonards. Borough Engineer, 37 Wellington Sq.

Hendon T.C. C. Wright, Ltd., have prepared plans for alterations to their factory at Forum Side, Edgware.

Ilkeston T.C. Tenders likely to be invited for erection of an additional 50 houses on Kirk Hallam estate.

Ipswich T.C. Construction of 28 flats on Maidenhall estate. Borough Surveyor, Tower St.

Kendal T.C. Tenders may shortly be invited for erection of about 36 houses on Hall Garth estate.

Lambeth B.C. Davis, Belfield and Everest, quantity surveyors, may be appointed for development of site 26 in Rosendale Rd. by erection of some 170 flats and houses.

Lancaster. Permission sought for building further 212 houses on The Ridge estate.

Long Eaton (Notts) U.D.C. Approval given to erection of 100 houses on Petersham Rd. estate.

Manchester. Application to be made for sanction to borrow £376,219 for additional school accommodation at Wythenshawe.

Monmouthshire. Approval received for erection of school at New Inn (£59,570) and one at Sirhowy (£28,443).

Newcastle-on-Tyne. Council to build 78 flats in Armstrong Rd. and 33 houses on section D of Montagu estate.

Northamptonshire. Grammar school to be built at Corby at estimated cost of £198,790, and extensions are to be carried out on Towcester Modern School estimated to cost £20,124. County Architect, County Hall, Northampton.

Ottery St. Mary (Devon) U.D.C. Tenders to be invited for construction of 38 dwellings in Longdog Lane.

Pembrokeshire. It is proposed to build 162 houses as first instalment, on site near Scarrowscant for Admiralty.

Peterborough. Tenders likely to be invited soon for erection of 116 houses on Dogsthorpe North estate.

Plymouth. Application to be made for sanction to borrow £17,387 for alterations and additions to Devonport High School for Girls.

Portsmouth. Weingarten Bros. are planning alterations to factory in Baker St., Landport, and C.J.C. Developments (Portsmouth) Ltd. factory extensions in Fitzherbert Rd., Farlington.

South Shields. Erection of training school at General Hospital. Architects are S. W. Milburn and Partners, 9 Esplanade, Sunderland.

Southall (Middx.). Scott and Browne, Ltd., propose extensions to factory in Johnson Street.

Stoke-on-Trent. Canteen, kitchen, laboratory and research offices, etc., are planned by Robert Hyde and Sons, Ltd., for steel foundry in High St. West, Fenton.

Sudbury T.C. Tenders to be invited for erection of 76 houses on Woodhall estate.

Surbiton. Plans in hand for factory additions for Decca Radar, Ltd. Ley Colbeck and Partners, architects, Palmerston House, Bishopsgate, London.

Tottenham B.C. Erection of public library, 16 maisonettes and three flats on Brereton Rd. site. Borough Engineer and Surveyor, Town Hall, N.15.

Uxbridge. U.D.C. has approved plans for factory extensions in Cowley Mill Rd. for Auto Diesels, Ltd.

TRADE NOTES

Beama Contract Price Adjustment Formulae.—*For Electrical Machinery and Equipment.* For purposes of calculating variations in: (*a*) "Rates of Pay"—the rate of pay for adult male labour at July 19 shall be deemed to be 134s.; (*b*) "Cost of Material"—the index figure for materials used in the electrical machinery industry published in the Board of Trade Journal on July 19 is 167·6.

For Turbo-Generating and Allied Plant. For purposes of calculating variations in: (*a*) "Rates of Pay"—the rate of pay for adult male labour at July 19 shall be deemed to be 134s.; (*b*) "Cost of Material"—the index figures published in the Board of Trade Journal on July 19 are: Materials used in mechanical engineering industries 151·7. "Blast Furnaces and Iron and Steel Melting and Rolling (40 and 41)", 142·6. The price of brass condenser tubes ¾ in. o/d, 18 swg published in The Metal Bulletin on July 18 is 3s. 9½d.

For Outstanding Contracts covered by the B.o.T. Intermediate Products Index. For purposes of calculating variations in: (*a*) "Rates of Pay"—the rate of pay for adult male labour at July 19 shall be deemed to be 134s.; (*b*) "Cost of Material"—the index figure for intermediate products published in the Board of Trade Journal on July 19 is 361·7.

Branch Office. Acheson Colloids, Ltd., have opened a West of England office at 103 Promenade, Cheltenham. Tel.: Cheltenham 3847.

Extension. Morganite Resistors, Ltd., Bede trading estate, Jarrow-on-Tyne, have been allocated a further 7,000 sq. ft. of factory space on the estate.

Holidays. The works of The Hepworth Iron Co., Ltd., will be closed from August 9 to 25.

New Factory. New Welbeck, Ltd., vacuum cleaner manufacturers of Luton, and R. J. Adcock and Co., Ltd., electrical engineers and makers of motors and small tools, of Kentish Town, N.W., have approached Brighton Corporation regarding the erection of a factory of about 10,000 sq. ft. for joint occupation at Moulsecoomb Way. The Corporation Land and Works Committee recommends that the Corporation agree to the scheme.

London Rep. The London area representative of H. Frost and Co., Ltd., is Mr. P. R. A. Abbey, 56 Aldridge Avenue, Stanmore, Middx. Telephone, Wordsworth 7215.

Scottish Agents. It is announced that the activities of Chamberlain Industries, Ltd., in Scotland are being handled by Gerard Wakeham, Ltd., of Carlton House, 26 Blythswood Square, Glasgow, C.2.

NEW COMPANIES

Extracted from the Register issued by Jordan and Sons, Ltd., 116 Chancery Lane, London W.C.2.

W. Burns and Son (Electric) Ltd. Electrical contractors, etc. Cap.: £1,000. Permanent dirs.: W. Burns, Mrs. A. L. Burns and T. Burns all of 254 South Rd., Sheffield 6.

Hepworth Iron Co. (Engineering) Ltd., Hazlehead, nr. Sheffield, Yorks. Hydraulic, heating, lighting, ventilation, gas, mining, agricultural, consulting, mechanical and general engineers, etc. Cap.: £20,000. Dirs.: J. F. Booth, P. Hinchliff, F. Cooling, F. E. Swallow and R. K. Smith.

Hockey Insulation Co. Ltd., Hodges Row, Bute St., Cardiff. Refrigerating, heating, ventilating and air conditioning engineers, etc. Cap.: £6,000. Dirs.: S. G. Haskins (gov. dir.) and Mrs. M. L. Haskins.

Ibex Electronics Ltd., 12 Mount St., Berkeley Sq., W.1. Manufacturers of and dealers in electronic equipment and electrical appliances, wireless and television sets and parts, etc. Cap.: £500. Dirs.: S. S. Steinbock and Muschi Miriam Steinbock.

Peter G. Rabjohn and Co., Ltd., 69 Manor Park Rd., Harlesden, N.W.10. Manufacturers of and dealers in precision instruments, dynamos, motors, etc. Cap.: £2,000. Dirs.: P. G Rabjohn and Mary L. C. Rabjohn.

Price Electrical (Lydney) Ltd., 36 High St., Lydney, Glos. To take over business formerly carried on by Geoffrey W. Price as "G. W. Price and Co." at High St., Lydney, general and electrical engineers and contractors, etc. Cap.: £2,000. Dirs.: G. W. Price and Kathleen M. Price.

Roma Electrical Supplies Ltd., 319 High Holborn, W.C.1. Cap.: £100. Dirs.: To be appointed by subs. Subs.: G. F. Pyle and J. A. Rose.

Skinner Electrical Manufacturing Co. Ltd., Dicker Mill, Hertford. Cap.: £1,000. Dirs.: W. G. Skinner, H. H. H. Hole and Margaret M. Skinner.

G. T. Smith and Son (Radio-Vision) Ltd., 22 High St., Chipping Norton, Oxon. Electrical engineers, electric wiring and installation contractors, dealers in electrical apparatus, etc. Cap.: £6,000. Dirs.: G.T.O. Smith, D. H. Smith.

Stone Bros. (Engineers) Ltd., motor, mechanical, constructional, electrical, gas, hydraulic, consulting and general engineers, etc. Cap.: £2,500. G. E. R. Saunders, 15 Church Rd., Walton, Liverpool 4, signs as dir.

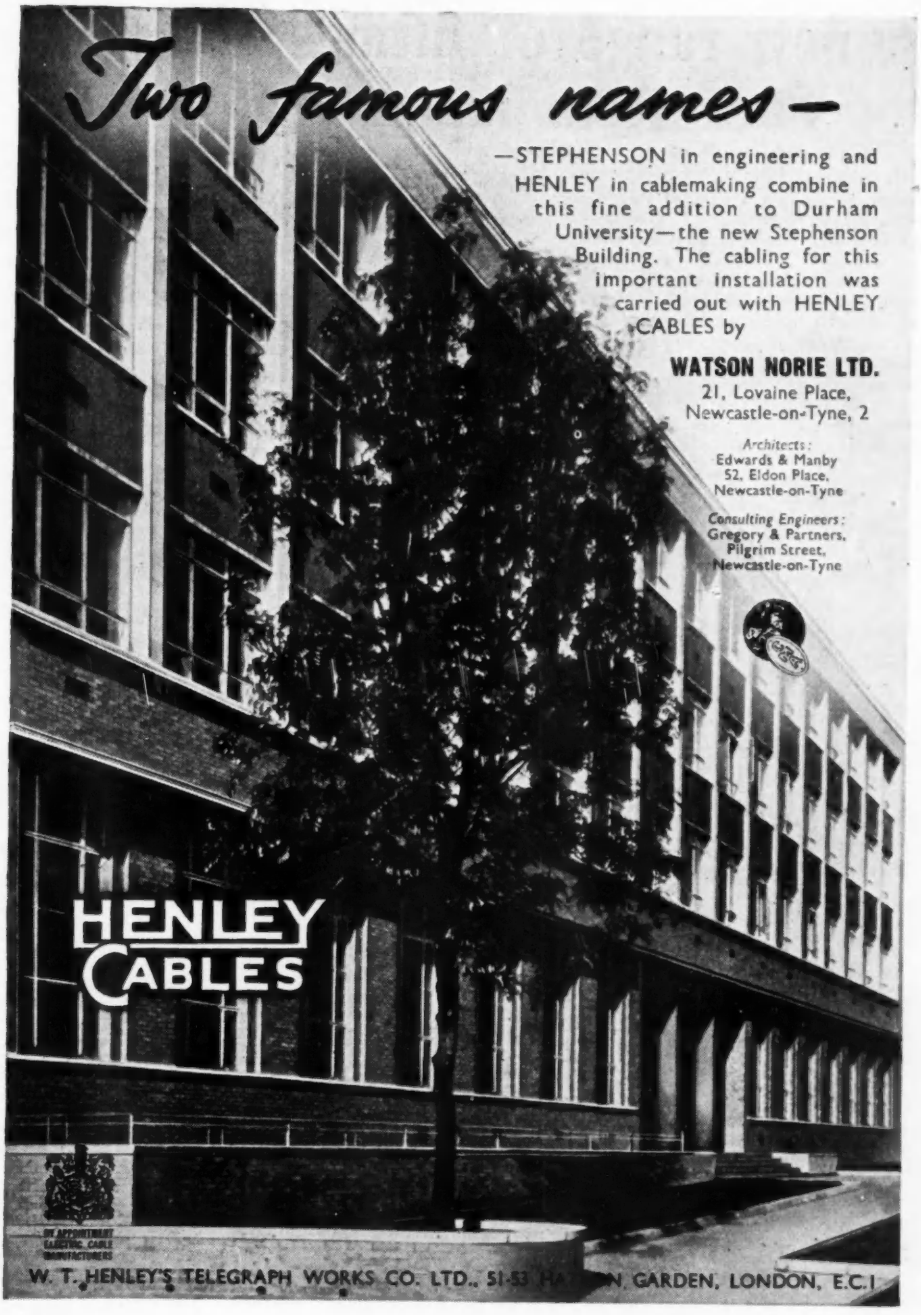
Telemaintenance (Pinner) Ltd., 421 Rayners Lane, Pinner. Manufacturers of and dealers in and repairers, servicers and hirers of electrical and mechanical apparatus, etc. Cap.: £100. Dirs.: R. L. Harrison and J. E. Earp.

Telecom Services Ltd., 2a Barking Rd., E.16. Electrical equipment specialists, repairers, service and maintenance engineers, manufacturers of and dealers in telecommunication, radio and television equipment, etc. Cap.: £500. Dirs.: A. F. Trinder, S. L. McCrerie and W. Hastings.

Westham (London) Ltd., 4 New Burlington St., W.1. Manufacturers of and dealers in stoves, cookers, ranges, boilers, geysers, heating, lighting, ventilating and temperature-control plant, etc. Cap.: £10,000. Dirs.: T. C. L. Westbrook, M. Steuerman and E. B. Higham.

White Horse Finance Co., Ltd., 241 Northdown Rd., Margate. To finance hire purchase arrangements in connection with the sale and purchase of artificial lighting apparatus, electrical plant, refrigerators, wireless and television sets, etc. Cap.: £2,000 Dirs.: E. J. Saunders, R. E. Saunders, and S. E. Stokes.

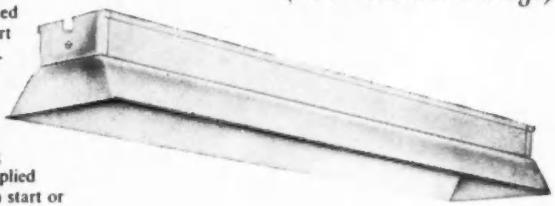
Trade Notes continued

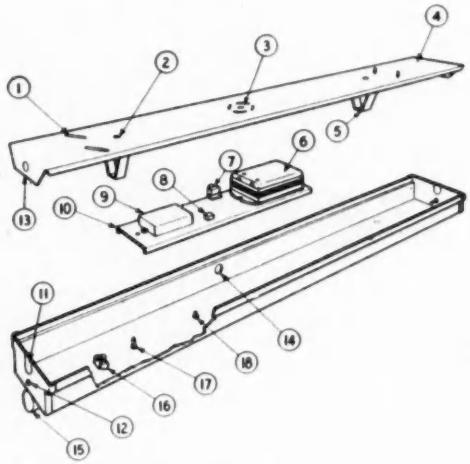

Two famous names—
—STEPHENSON in engineering and HENLEY in cablemaking combine in this fine addition to Durham University—the new Stephenson Building. The cabling for this important installation was carried out with HENLEY CABLES by
WATSON NORIE LTD.
21, Lovaine Place,
Newcastle-on-Tyne, 2
Architects:
Edwards & Manby
52, Eldon Place,
Newcastle-on-Tyne
Consulting Engineers:
Gregory & Partners,
Pilgrim Street,
Newcastle-on-Tyne
HENLEY
CABLES
W. T. HENLEY'S TELEGRAPH WORKS CO. LTD., 51-53 HATTON GARDEN, LONDON, E.C.1

A new range of fittings for fluorescent lamps

This entirely new range of Metrovick fluorescent fittings is based on a standard channel with interchangeable reflectors.
Different styles of reflectors are readily attached to the channel and for stocking and transport they can be nested together and easily stacked.
No live parts are exposed when the reflectors or enclosures are removed for cleaning.
All the fittings are constructed of sheet steel, bonderised and stove enamelled. They are complete with lampholders and wiring and unless it is stated otherwise they are supplied complete with auxiliary gear either for switch start or instant start as required.

A complete unit
(Closed-end metal trough)





Exploded view of Basic Channel for Metrovick Fluorescent Fittings

Easily stocked
Easily erected
Easily maintained

Send for leaflet 4121/21-2

1. Fixing slots for close ceiling mounting.
2. ¾ in. conduit knockout for conduit or chain suspension.
3. B.S. conduit box entry.
4. Backplate.
5. Bracket for securing channel to backplate.
6. MRJ Choke.
7. Starter switch and socket.
8. Terminal block and earthing terminal.
9. Capacitor.
10. Gear tray.
11. ¾ in. conduit knockout for end entry.
12. Screws for attaching endplates.
13. ¾ in. conduit hole to terminate end entry.
14. Starter hole.
15. Flicker shield.
16. Oddie Clip holding reflector.
17. Captive screw for channel fixing.
18. Stud for fixing gear tray.

METROVICK

METROPOLITAN-VICKERS ELECTRICAL COMPANY LTD., ST. PAUL'S CORNER, 1-3 ST. PAUL'S CHURCHYARD, LONDON, E.C.4.

Member of the A.E.I. group of companies

S/F105

CLASSIFIED ADVERTISEMENTS

OFFICIAL TENDERS AND APPOINTMENTS

WANTED · FOR SALE WORK WANTED

Those wishing to advertise in these pages should send the text to the Classified Advertisement Dept., Electrical Times, Sardinia House, Sardinia Street, London W.C.2, before 10 a.m. on TUESDAY of week of issue. Official Displayed Advertisements are charged at 42s. per inch, and all other classified advertisements at 3s. per line. Situations Wanted will be published four times for twice the single insertion rate. Fee for Box No. and postage on replies is 2s.

TENDERS INVITED

METROPOLITAN BOROUGH OF GREENWICH

ELECTRIC STREET LIGHTING

TENDERS are invited for the following work:—

Contract No. 1. THE REMOVAL of 367 h.p. GAS COLUMNS and the adaptation and re-erection of 233 columns, and the adaptation in situ of 141 columns.

Contract No. 2. THE PROVISION of BRACKET ARMS, LANTERNS, CONTROL GEAR AND WIRING to the 374 adapted columns and 2 suspended lanterns.

The specifications, schedules and tender forms relating to the above contracts may be obtained upon application to the Borough Engineer and Surveyor, Town Hall, Greenwich, S.E.10, at whose office the planned lay-out may be inspected, and upon the deposit of two guineas with the Council, which sum will be refunded upon the receipt of a bona fide tender which is not subsequently withdrawn and the return of the schedules and specifications in good condition.

Tenders must arrive by noon on Wednesday, September 3, 1952. (A 455)

LEEDS CORPORATION

TENDERS are invited for the SUPPLY of 60 Side Entry and One Top Entry (1" BSP) totally enclosed 140 watt SODIUM LANTERNS, complete with the necessary control gear, to be housed in the canopy.

Sealed tenders, in plain envelope and endorsed 'Tender —Sodium Lanterns' to be forwarded to the Town Clerk, Room 57, Civic Hall, Leeds, 1, not later than Monday, August 11, 1952.

L. A. DOXEY,
Engineer.

Street Lighting Department,
Leeds 12. (A 486)

BOROUGH OF KENDAL

GROUP "A" STREET LIGHTING SCHEME

Aynam Road, Windermere Road, etc.

TENDERS are invited for the PROVISION AND INSTALLATION of 72 MERCURY VAPOUR LIGHTING UNITS and 7 FLUORESCENT LIGHTING UNITS including the provision and erection of reinforced concrete columns, and the supply and fitting of lanterns complete with all auxiliary equipment and wiring.

Specification, Bill of Quantities and Form of Tender may be obtained from, and plans, and general conditions of contract inspected, at the office of the Borough Engineer and Surveyor, Municipal Offices, Lowther Street, Kendal.

Tenders in a plain sealed envelope endorsed "Street Lighting" must be delivered to the undersigned not later than Friday, September 12, 1952.

The Council do not bind themselves to accept the lowest or any tender.

H. W. JONES,
Town Clerk.

Town Hall,
Kendal. (A 487)

APPOINTMENTS VACANT

Engagement of persons must be made through a Local Labour Office or Scheduled Employment Agency, if the applicant is a man aged 18-64, or a woman aged 18-59; unless the person concerned is excepted or the employment is in a managerial or professional capacity, or is otherwise excepted from the provisions of the Notification of Vacancies Order, 1952.

GOVERNMENT OF KUWAIT

SHIFT CHARGE ENGINEER

APPLICATIONS are invited for an appointment as Shift Charge Engineer with the Government of Kuwait for a Water Distillation Plant and Power Station now being erected in Kuwait, Persian Gulf. In the first instance the Distillation Plant will be capable of distilling one million gallons of water per day from sea water and the Power Station will have a total capacity of 30,000 kW. Applicants should have at least three years' experience in a similar position and for men of suitable experience a commencing consolidated salary of £1,600 per annum is offered. Free furnished accommodation, when available, will be provided in addition to the salary, but State employees are required to pay for their own messing and servants. In the first instance the term of service will be one year and if satisfactory, the Contract may be extended a further two years. The rate of leave for the last two years will be sixty days per year of service. Applications in writing giving full particulars of training, qualifications and experience should be addressed in the first instance to the Secretary, Ewbank and Partners Limited, Engineering Consultants, 10/11 Grosvenor Place, London, S.W.1. (A 489)

NORTH WESTERN ELECTRICITY BOARD

APPOINTMENT OF PRINCIPAL ASSISTANT—STATISTICS

Consumers' Engineer's Department, No. 5 Sub-Area, Blackburn

APPLICANTS should have experience in estimating future loads and development, organisation of consumer and appliance records, sampling analysis and collection of information for tariff standardisation.

Salary, £755 to £845 p.a., N.J.C. conditions.

Applications to Sub-Area Manager, No. 5 Sub-Area, The North Western Electricity Board, Jubilee Street, Blackburn, by August 2, 1952. (A 469)

BRITISH ELECTRICITY AUTHORITY

London Division

APPLICATIONS are invited for the following superannuable posts. Salary, including London Allowance, and conditions of service in accordance with N.J.B. Agreement.

DEPUTY POWER STATION SUPERINTENDENT

Bankside Generating Station

Qualifications: sound technical training and wide practical experience in electrical and mechanical engineering and in power station practice. Applicants should have experience in the maintenance and operation of h.p. plant and experience in oil firing will be an advantage. Salary—Schedule A, Class "H," Grade 3—£1,060 p.a.

SHIFT CHARGE ENGINEER

Lombard Road Generating Station

Technical qualifications up to Higher National Certificate standard and good general education. Considerable experience in efficient operation of Turbo-Alternators and Boiler Plant essential. Character and ability to deal with staff problems important. Salary—Schedule A, Class "F," Grade 7—£710 17s. p.a.

ENGINEERING DRAUGHTSMEN

Transmission Department, Divisional H.Q.

Candidates should have received good general education and general Drawing Office experience covering preparation of cable route records, be experienced in surveying of cable routes, and have received training in preparation of substation layouts and site surveying. Salary—Schedule D, Grade 6—£438 to £574 7s. p.a.

Applications stating age, qualifications and experience to Divisional Secretary, B.E.A., London Division, Ergon House, Horseferry Road, S.W.1, within 14 days of this advertisement. (A 462)

BRITISH ELECTRICITY AUTHORITY

East Midlands Division

APPLICATIONS are invited for the following posts in the Construction Department of this Division:—

FIRST ASSISTANT ENGINEER (RESIDENT)

Castle Donington. Vacancy No. 62/52

The duties for the above position include general supervision of the erection and commissioning of all mechanical and electrical plant, for example, turbo alternators and condensing plant, feed heating equipment, boilers, pumps, high pressure steam and feed piping, switchgear, transformers and cables, coal and ash handling plant and ancillary equipment. Candidates should be Corporate Members of the Institution of Mechanical Engineers or the Institution of Electrical Engineers, and should be experienced in the supervision of such power station equipment and in co-ordinating work on site in close collaboration with the Resident Engineer responsible for civil engineering and building works and with Divisional Headquarters staff.

FIRST ASSISTANT ENGINEER (MECHANICAL)

Divisional Headquarters. Vacancy No. 63/52

The duties of this position will consist of the preparation of designs and layout of equipment for power stations, drafting of specifications for mechanical plant, supervision of contracts with plant contractors, the approval of design and construction of mechanical plant required for modern power stations generally as outlined under vacancy No. 62/52. Applicants must be Corporate Members of the Institution of Mechanical Engineers or the Institution of Electrical Engineers and the possession of a university degree in mechanical or electrical engineering will be an advantage. They should have had workshop and drawing-office training, and experience in the construction and operation of modern power stations will be a recommendation.

The salary for the above appointments will be within Schedule C, Class "AX/DX," Grade 1 (£945 to £1,173 p.a.) of the N.J.B. Agreement.

THIRD ASSISTANT ENGINEERS (ELECTRICAL)

Divisional Headquarters. Vacancy No. 64/52

Applicants should have had a fundamental training in electrical engineering, including workshops, and should preferably have had experience in the manufacture, erection, maintenance and operation of switchgear transformers, electrical auxiliaries, main and multicore cablework and lighting and heating installations for large power stations. Candidates should possess a university degree or equivalent qualification in electrical engineering.

THIRD ASSISTANT ENGINEERS (MECHANICAL)

Divisional Headquarters. Vacancy No. 65/52

Applicants should have had a fundamental training in mechanical engineering, including workshops, and should preferably have had experience in the manufacture, erection, maintenance and operation of mechanical plant as installed in modern power stations. Candidates should possess a university degree or equivalent qualification in Mechanical Engineering.

The salary for the above appointments (Nos. 64 and 65/52) will be within Schedule C, Class "AX/DX," Grade 5 (£629 to £834 per annum) of the National Joint Board Agreement.

SHIFT CONTROL ENGINEER

Longford Power Station. Vacancy No. 66/52

Applicants should have had a sound training and practical experience in switchgear operation in a modern power station. The possession of technical qualifications is desirable.

Salary will be in accordance with Class "G," Grade 10 (£588 to £610 per annum) of the National Joint Board Agreement.

Closing date for receipt of applications for Vacancies 62-66/52, August 7, 1952.

SHIFT CHARGE ENGINEER,

Lincoln. Vacancy No. 70/52

Applicants should have had a sound training and considerable practical experience in Power Station Operation. The possession of a Higher National Certificate in Mechanical or Electrical Engineering, or its equivalent, will be an advantage.

The salary will be in accordance with Class "F," Grade 7 of the National Joint Board Agreement.

Closing date for receipt of applications for Vacancy 70/52, August 11, 1952.

All the above positions are pensionable within the provisions of the British Electricity Authority and Area Boards Superannuation Scheme.

Application forms which may be obtained from the Divisional Establishments Officer, British Electricity Authority, Barker Gate, Nottingham, should be submitted to the undersigned. Please quote vacancy number.

L. F. JEFFREY,
Divisional Controller.
(A 463)

GOVERNMENT OF IRAQ

ASSISTANT ELECTRICAL ENGINEER required for the Power and Water department of Basrah Port Directorate, Iraq, for one year in first instance. Commencing salary according to qualifications and experience in scale I.D. 60 rising to I.D. 80 a month (I.D. 1 = £1). Cost-of-living allowance between I.D. 10 and I.D. 14 a month, according to dependants. Provident fund. Free passages. Liberal leave on full salary. Candidates must have served an apprenticeship with a recognised firm of electrical engineers and have had good practical experience in the maintenance and repair of electrical motors and machinery (a.c. and d.c.), house wiring, instrument repair, switchgear maintenance, cable jointing, etc. They should possess a technical qualification of at least ordinary National Certificate standard.

Apply at once by letter stating age, full names in block letters and full particulars of qualifications and experience and mentioning this paper to the Crown Agents, 4 Millbank, London, S.W.1, quoting on letter M.29182.B. The Crown Agents cannot undertake to acknowledge all applications and will communicate only with applicants selected for further consideration. (A 466)

BRITISH ELECTRICITY AUTHORITY

North Western Division

VACANCY No. 761—FIRST ASSISTANT CHEMIST, Huncoat Generating Station, near Accrington. Salary, £587 to £609 p.a. (N.J.B. F9). Applicants should preferably hold the A.R.I.C. or a degree in chemistry, but those with H.N.C. will be considered particularly if they are engaged on further studies. Experience in chemical testing of coal, water and oil for power plant is desirable but not essential if had good experience in chemical analysis.

Applications quoting vacancy number, stating age, experience, qualifications and present position should be received by the Establishments Officer, British Electricity House, 825 Wilmslow Road, Manchester 20, not later than August 2. (A 470)

NORTH EASTERN ELECTRICITY BOARD

York Sub-Area

APPLICATIONS are invited for the appointment of a THIRD ASSISTANT DISTRICT ENGINEER at Whitby. Applicants should have sound technical and practical training, and experience of construction, operation and maintenance of underground and overhead H.V. and L.V. networks.

Salary (Schedule A, Class "B," Grade 9—£476 to £500 and conditions of service in accordance with N.J.B. Agreement.

Applications, stating age, qualifications and experience, should be forwarded to the Secretary (Establishments), The North Eastern Electricity Board, Carliol House, Newcastle upon Tyne, 1, within ten days of the appearance of this advertisement. (A 461)

SOUTH AFRICA

SKILLED CABLE JOINTERS required for Transmission and Distribution System in the Electricity Undertaking at Cape Town.

Applicants must have served a recognised apprenticeship and have had subsequent training and experience in the jointing of extra high tension and low tension cables. Experience in the making of joints in oil and/or gas-filled 66 kV cables will be a recommendation.

Pay from 3/9 per hour for 46 hour week plus cost-of-living allowance at present £4 17s. 1d. per week for married and £2 2s. per week for single men. Paid holidays and sick leave, pension scheme.

Apply first at any Employment Exchange, quoting reference No. O.M.P.1217/52.

DAVIS & SOPER, LTD.
Agents to the City Council of Capetown.

52 and 54 St. Mary Axe,
London E.C.3. (A 447)

MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD

TWO ASSISTANT SECTION ENGINEERS required in the Oswestry District. Salaries N.J.B. D/9 (£541 to £557 p.a.).

Applicants should preferably have the technical qualifications to enable them to become Chartered Electrical Engineers, and have had experience of E.H.V. and M.V. Overhead and Underground Distribution work. The appointments are superannuable and subject to medical examination.

Application forms obtainable from the Manager, No. 4/5 Sub-Area, Merseyside and North Wales Electricity Board, Electricity House, Rhostyllen, Wrexham. Closing date August 6, 1952. (A 488)

BRITISH ELECTRICITY AUTHORITY

South Eastern Division

KINGSTON "B" Power Station. MAINTENANCE ENGINEER (ELECTRICAL), B.Sc. degree or equivalent preferred. Extensive experience in the maintenance of e.h.t. switchgear, motors, alternators, and all electrical and auxiliary plant appertaining to a large power station and in the control of labour essential. Class "G," Grade 6, £800 2s. per annum, including London allowance.

Brighton "A" Power Station. ASSISTANT MAINTENANCE ENGINEER (ELECTRICAL). Higher National Certificate preferred. Experience required in the maintenance of alternators, e.h.t. switchgear and motors and all electrical and auxiliary plant. Class "H," Grade 9, £660 per annum. N.J.B. conditions of service and salary. Applications on forms obtainable from Station Superintendent at either Kingston "B" Power Station, Downhall Road, Kingston-upon-Thames or Brighton Power Station, Portslade-by-Sea, Sussex, to be forwarded to the Superintendent by August 11. (A 452)

SOUTH WALES ELECTRICITY BOARD

REQUIRED, JUNIOR DISTRIBUTION CONTROL ENGINEER (Shift Duties) at the Control Centre, Upper Boat.

Duties will involve assisting the Control Engineer (Shift) in the operating of an extensive Overhead and Underground High Voltage network, and applicants should have experience in the operation of Switchgear of all voltages, Transformers and Associated Protection Equipment, and be familiar with the working of Safety Regulations.

Applicants should have had a sound engineering training and should have at least the Ordinary National Certificate in Electrical Engineering.

Salary will be in accordance with Class "AX/CX" (£375 to £536) of the National Joint Board Agreement.

Applications stating age, present position and salary, qualifications and experience, and giving three referees to be addressed to the Secretary to arrive by August 2, 1952.

D. G. DODDS,
Secretary.

St. Mellons,
Cardiff. (A 459)

BRITISH ELECTRICITY AUTHORITY

Midlands Division

SHIFT CHARGE ENGINEER required at Meaford Generating Station. N.J.B. service conditions, superannuable appointment, salary within Schedule "A," Grade G7, commencing at £704 per annum.

Higher National Certificate in electrical and mechanical engineering required, and sound technical training and practical experience in the control and operation of steam generating plant and main switchgear, or mechanical and electrical experience in a manufacturer's works.

Application forms available from Establishments Officer, 53 Wake Green Road, Moseley, Birmingham 13, and should be returned by August 9, 1952. (A 467)

SOUTH WALES ELECTRICITY BOARD

REQUIRED, DISTRICT ENGINEER in District 341 Aberdare, in the Central Sub-Area of the Board.

Preference will be given to applicants who possess either an Engineering Degree of a British University, The Higher National Certificate in Electrical Engineering or its equivalent.

The salary for the position will be in accordance with Class "D," Grade 2 (£869 to £885 to £900) of the National Joint Board Agreement.

Applications stating age, present position and salary qualifications and experience and giving three referees, to be addressed to the Secretary, to arrive by August 2, 1952.

D. G. DODDS,
Secretary.

St. Mellons,
Cardiff. (A 460)

MIDLANDS ELECTRICITY BOARD

GENERAL ASSISTANT DISTRICT ENGINEER required in the Gloucester District of the Central Gloucestershire Sub-Area. Experience necessary in all branches of Distribution Work including the operation and maintenance of high and low voltage, underground and overhead distribution systems. Technical qualifications desirable. Salary £504 to £513 to £521 per annum (N.J.B. Class "E." Grade 11), superannuable.

Apply in writing within 14 days stating age, experience, present salary and position and quoting reference GLOS/T/149 to:—Mr. D. Holt, Manager, Central Gloucestershire Sub-Area, Midlands Electricity Board, 126 London Road, Gloucester.

A. STEPHENS,
Secretary.
(A 458)

CENTRAL ELECTRICITY BOARD
FEDERATION OF MALAYA

ELECTRICAL ENGINEERS required by the Central Electricity Board, Federation of Malaya. Option of appointment either (a) on agreement for 3 years in the first instance leading, subject to satisfactory service, to an offer of permanent employment on the pensionable establishment, with opportunity of terminating appointment at the end of the first year's service if so desired; or (b) on contract for 3 years with a gratuity on satisfactory completion of final service at the rate of £50 or £70 for each completed period of 3 months service, according to salary. Salary (including allowances) payable in local currency equivalent at present Government rate of exchange to £1,078 rising to £1,988 a year. Commencing salary according to qualifications, war service and experience. Additional allowance payable to married men according to dependants. Free passages. Liberal leave on full salary. Candidates are required for the following duties:—

(A) DISTRIBUTION WORK (M.25016.B). Candidates must have had sound training in both electrical and mechanical engineering with experience in the operation of medium Electricity Supply Undertakings and possess a competent knowledge of the erection and maintenance of high and low tension overhead and underground a.c. distribution systems and substation plant.

(B) MECHANICAL WORK (M.28370.B). Candidates must have had sound training in both electrical and mechanical engineering with experience in the operation and maintenance of diesel-alternator generating plant of up to 1,000 kW units.

(C) COMMERCIAL WORK (M.29300.B). Candidates must have had not less than five years' experience on the commercial side of a large electricity undertaking involving costing and estimating of major electrical works.

(D) HYDRO-ELECTRIC WORK (M.25728.B). Candidates must be able to carry out preliminary investigations for hydro-electric schemes; to arrange for surveys for projected schemes; to prepare designs and contracts for small schemes up to 10,000 kW and to supervise the construction of the works.

Candidates for (a), (b) and (c) should preferably be Corporate Members or Graduates of the Institutions of Electrical or Mechanical Engineers, or possess degrees or other qualifications carrying exemption from the Institutions' Graduateship examinations; and for (d) should preferably be Corporate Members of the Institution of Civil Engineers or possess qualifications carrying exemption from Sections A and B of the Institution's examination or equivalent civil engineering qualifications. Candidates not possessing the above qualifications would be eligible for salary on a lower scale equivalent to £1,057 rising to £1,757 a year (including allowances).

Apply at once by letter, stating age, full names in block letters, and full particulars of qualifications and experience, and mentioning this paper to the Crown Agents for the Colonies, 4 Millbank, London, S.W.1, quoting on letter the reference number against the appointment for which application is made. The Crown Agents cannot undertake to acknowledge all applications and will communicate only with applicants selected for further consideration. (A 465)

SOUTH EASTERN ELECTRICITY BOARD

DEMONSTRATOR (N.J.C.)

Medway District

SALARY £360 by £20 to £140 by £10 to £450 p.a., Grade 1. Superannuable. Applicants must be fully experienced in demonstrating to consumers in their own homes all types of domestic electric appliances and be able to organise and conduct public lectures. Appropriate domestic science or housecraft qualifications an advantage.

Applications, giving 2 referees, must reach H. F. Knell, J.P. M.I.E.E., Kent Manager, SEEBoard, 178/184, High Street, Rochester, through an employment exchange, by August 5, 1952.

ASSISTANT DISTRICT ENGINEER

West Kent District

Salary £629 to £660 p.a. plus London Weighting under N.J.B. E.7. Superannuable. Applicants should be qualified and preferably Corporate Members of the I.E.E., with experience in all distribution work dealing with single and three-phase systems up to 33 kV and indoor and outdoor type sub-stations, also in estimating for system extensions and reinforcements. Knowledge of rural electrification desirable. Duties involve standby.

Applications, giving 2 referees, on forms obtainable from P. S. Watson, M.I.E.E. West Kent Manager, SEEBoard, 270 High Street, Orpington, Kent, to be returned to him through an employment exchange by August 5, 1952.

A. L. BURNELL,
Secretary.

July, 1952. (A 464)

BRITISH ELECTRICITY AUTHORITY

Southern Division

APPLICATIONS are invited for JUNIOR ENGINEERS in Generating Stations in the Division.

Salary N.J.B. £375 to £496, the point of entry depending on qualifications, experience, and the size of the station to which appointed.

With the continuing expansion of the industry and the installation of additional generating plant the chances of promotion for suitable candidates are considered to be good.

Applicants should have had a sound general education and an apprenticeship or practical training suitable to the industry. Preference will be given to graduate members of a recognised professional institution or those possessing a University Degree or Higher National Certificate. Those awaiting the results of recent examinations will also be considered.

The duties of those appointed will vary with each station, but will include as a general rule the operation and control, under supervision, of generating plant. Vacancies also exist for those who wish to specialise in the maintenance of instruments and other electrical and mechanical generating plant. Applicants should be prepared to accept shift duties if called upon to do so.

The appointments are superannuable and subject to a satisfactory medical examination.

Forms of application may be obtained from P. D. A. Oliver, Divisional Secretary, 111 High Street, Portsmouth, and must be returned by August 8, 1952. (A 457)

SOUTH WALES ELECTRICITY BOARD

REQUIRED, three JUNIOR ENGINEERS (PROTECTION)—two based on Fforestfach, and one on Upper Boat, Control Centre.

The successful applicants will be required to assist the Protection Engineer in carrying out Commissioning and Maintenance tests on all classes of protective gear on the Board's distribution system and should have had a sound engineering training. Preference will be given to those who possess the Higher National Certificate.

Salary will be in accordance with Class "AX/CX" (£375 to £536) of the National Joint Board Agreement.

Applications stating age, present position and salary, qualifications and experience, and giving three referees, to be addressed to the Secretary to arrive by August 2, 1952.

D. G. DODDS,
Secretary.

St. Mellons,
Cardiff. (A 458)

BRITISH ELECTRICITY AUTHORITY

South Western Division

ASSISTANT ENGINEER (MAINTENANCE) required at Castle Meads Generating Station, Gloucester.

Superannuation scheme. Provisional salary N.J.B. Class "E," Grade 9, £567-£579 (subject to confirmation by the District and National Joint Boards).

Applicants must have had a sound mechanical training and preferably be experienced in the maintenance of steam raising plant.

Apply by August 2, 1952, stating age, qualifications, experience, present appointment and salary, to R. C. Barrett, Divisional Secretary, 26 Oakfield Road, Bristol 8.

July 16, 1952. (A 449)

BRITISH ELECTRICITY AUTHORITY

North Western Division

VACANCY No. 760, JUNIOR ENGINEER, Padiham Generating Station. Commencing salary £375 rising to £426 (N.J.B. E. 15/14).

Vacancy No. 762, GENERAL ASSISTANT ENGINEER (EFFICIENCY) at No. 2 Sub-Division, situated at Kearsley Generating Station, near Manchester. Salary £481-£674 (N.J.B. AX/DX.8). Duties will include recording and compilation of statistical data, together with general assistance during steam plant testing.

Apply to Establishments Officer, British Electricity House, 825 Wilmslow Road, Manchester 20, before August 2. Quote vacancy number. (A 450)

BRITISH ELECTRICITY AUTHORITY

South Eastern Division

SHIFT CHARGE ENGINEER, Croydon "A" Power Station. Applicants should have had suitable technical training and experience in the operation of high pressure turbine and boiler plant and e.h.t. switchgear. N.J.B. conditions of service and salary Class "F," Grade 7 (£710 17s. per annum, including London allowance).

Applications on forms obtainable from Station Superintendent, Croydon "B" Power Station, Beddington Farm Lane, Purley Way, Croydon, Surrey, to be received by him not later than August 9, 1952. (A 468)

The expansion of the
ENGLISH ELECTRIC GROUP OF COMPANIES

has created vacancies for men with suitable works background and academic qualifications to solve production problems by the efficient utilisation of the most modern machine tools and methods.

Consequently, applications are invited from **SENIOR** and **JUNIOR PRODUCTION** and **METHODS PLANNING ENGINEERS.**

Please write, giving full details of experience and qualifications, quoting reference S.A.24, to:—

Central Personnel Services
English Electric Company Ltd.
24-30 Gillingham Street,
London, S.W.1. (A 474p)

ASSISTANT DESIGNER DRAUGHTSMAN required by electrical switchgear manufacturers in Devon. Age 25-30, with good technical, mechanical and practical knowledge of medium voltage metalclad switchgear. Applicants must have ability and should have Higher National Certificate or equivalent qualifications. Permanent and progressive position. Starting salary commensurate with experience and qualifications.—Box No. 1895, Electrical Times. (A 442)

A WELL-KNOWN FIRM of Electrical and Mechanical Manufacturing Engineers needs two REPRESENTATIVES, one for London area, other for Yorkshire, Durham, Northumberland. Both appointments, which carry good salary, commission and expenses, offer exceptional opportunities for young men of marked selling ability. —Box No. 1901, Electrical Times. (A 490)

DRAUGHTSMAN used to boiler plant and industrial pipe installations of all classes, able to take own dimensions at site. State age, experience and salary required. Pension scheme.—The Brightside Foundry and Engineering Co. Ltd., 17 Summer Row, Birmingham 3. (A 471)

EFFICIENCY ENGINEER. Applications are invited for the position of Power Plant Efficiency Engineer in a large industrial undertaking near London. Applicants must have a knowledge of economics as applied to plant operation, and must possess at least Higher National qualifications. Very good prospects for a suitable engineer, with a commencing salary of £950.—Reply to Box No. 1883, Electrical Times, quoting reference TEE/2. (A 402)

EWBANK AND PARTNERS LIMITED have the following vacancies for staff on various projects which they are engineering in Kuwait, Persian Gulf:—

(a) QUALIFIED ASSISTANT CIVIL ENGINEER, with at least 5 years' experience in general civil engineering work, particularly with reference to heavy plant foundations, steel jetty work and reinforced concrete work.

(b) CIVIL ENGINEERING INSPECTOR, particularly experienced in the supervision of pipe-laying for a large water distribution scheme. Preference will be given to applicants who have experience with water works schemes.

(c) BUILDING INSPECTOR with all-round experience in civil work, especially with heavy mass reinforced concrete.

(d) CIVIL ENGINEERING INSPECTOR, who has had a good all-round experience in civil work, especially reinforced concrete work and the erection of structural steelwork.

(e) ASSISTANT STOREKEEPER, aged between 25 and 30 years. Applicants should have had experience in either civil, mechanical or power station stores.

Applications, giving full details of experience and qualifications, should be addressed to the Secretary, Ewbank and Partners Limited, Engineering Consultants, 10/11 Grosvenor Place, London, S.W.1. (A 477)

BOX No. replies to be addressed to the ELECTRICAL TIMES, Sardinia House, Sardinia Street, London W.C.2

Engagement of persons must be made through a Local Labour Office or Scheduled Employment Agency, if the applicant is a man aged 18-64, or a woman aged 18-59; unless the person concerned is excepted or the employment is in a managerial or professional capacity, or is otherwise excepted from the provisions of the Notification of Vacancies Order, 1952.

ELECTRICAL DRAUGHTSMAN required, with some estimating experience on constructing and factory maintenance.—Apply, Employment Manager, Vickers-Armstrongs Limited (Aircraft Section), Weybridge, Surrey. Applications, with certain exceptions, are subject to the approval of the Ministry of Labour and National Service. (A 472)

ELECTRICAL ENGINEER required. East Midlands. Graduate preferred. Apprenticeship with reputable electrical manufacturers. Experienced in design and specification of industrial a.c. and d.c. machinery, transformers, wiring and testing. Fully conversant with I.E.E. and Government safety regulations. Some knowledge electrical power supply and distribution, good mechanical background. Age about 30. Staff pension scheme.—Please submit full details of education, training and experience, and state salary required, to Personnel Manager, Box No. 1875, Electrical Times. (A 387)

ELECTRICAL ENGINEER required for electrical department of works in the North East. Should have a sound practical training, drawing office experience, a knowledge of motor control gear resistance calculations, and preferably some experience of electrical heating for industrial applications.—Apply, giving full details of experience, technical qualifications, age, whether married or single, and salary required, to Box No. 1871, Electrical Times. (A 376)

METER manufacturers, N.W. London, require SENIOR and JUNIOR TEST ENGINEERS. State education, technical training, experience, salary required.—Box No. 1899, Electrical Times. (A 473)

REPRESENTATIVE wanted by well-known electrical wholesaler for Leeds area, to call on factories and contractors. Previous experience essential. Substantial existing connection handed over with appointment. Apply in confidence with full details of age, experience and salary required.—Box No. 1897, Electrical Times. (A 451)

SENIOR DRAUGHTSMAN required for work on electrical power resistances and large electric heaters for industrial applications. Previous experience on this class of work desirable but not essential.—Apply by letter with full details, including age, technical qualifications, whether married or single and salary required, to the Expanded Metal Co. Ltd., Stranton Works, West Hartlepool. (A 377)

SENIOR ELECTRICAL DRAUGHTSMAN required for modern London office; preferably with experience of power distribution and lighting installations as applied to chemical and oil refinery plants. Qualifications to H.N.C. standard. Good conditions, 5-day week, pension scheme.—Write full particulars, age, qualifications and experience to Box No. 6017, c/o Charles Barker and Sons, Limited, 31 Budge Row, London, E.C.4. (A 454)

TECHNICAL ASSISTANT for patent work in the office of a large firm of patent lawyers in Ottawa. Electrical knowledge essential. Initial interview in London, England. Applicant must be interested in taking up permanent residence in Canada.—Write, giving details of degree and experience, to Matthews, Haddan and Co., Chartered Patent Agents 31/2 Bedford Street, London, W.C.2. (A 476)

TECHNICAL INSTRUCTOR required by large oil company for Middle East to supervise and assist in on-the-job training of electrical tradesmen and apprentices. Applicants, apprentice-trained and holding H.N.C., should have had practical and instructional experience. Substantial allowances in addition to salary; pension fund; biennial (paid) home leave. No married accommodation for first tour. Age limits 27-40.—Write, quoting No. 212 to Box No. 6012, c/o Charles Barker and Sons, Limited, 31 Budge Row, London, E.C.4. (A 453)

TECHNICAL SALES ENGINEERS are required in a number of areas as Branch Representatives. Applicants must have had sound technical education, and apprenticeship with reputable electrical manufacturers or equivalent practical training, preferably to A.M.I.E.E. standard. Some commercial experience would be an advantage. Age limit approximately 28-35. Permanent position, good pension scheme, ample scope and prospects are offered to men of keen intellect and initiative, and able to work with a minimum of direction but backed by the resources of a large organisation whose products are employed throughout the electrical manufacturing industry.—Write, giving personal particulars, details of qualifications and experience, and order of salary expected, to Box No. 1903, Electrical Times. (A 491)

TRANSFORMER ENGINEERS required for work on all sizes of power, distribution and instrument transformers. Salary commensurate with experience and ability.—Apply in writing, stating age, qualifications, previous experience, etc., marking envelope "Transformer Engineering," to Personnel Manager, Metropolitan-Vickers Electrical Co. Ltd., Trafford Park, Manchester 17. (A 475)

WORK WANTED

A.C. and d.c. Motor Rewinds and Repairs. Prompt service, fully guaranteed. Edgware 5566 (4 lines) —Service Electric Co., Ltd., Stanmore, Middx. (A 19)

CASTINGS. Fisher Foundries, Ltd., Great, Birmingham, have capacity for brass, gun metal and soft grey iron machine moulded repetition castings weighing 1-30 lb. Loose pattern work up to 3 cwt. Delivery by road to all parts. Tel.: B'ham, Victoria 0197. (A 25)

CONDENSER AND TRANSFORMER CASES. Special boxes and covers. Sheet metal and press-work for the electrical trade. May we quote you? A.I.D. approved.—Conway-Tolhurst Ltd., Airport, Cardiff. (A 326)

METALWORK. All types cabinets, chassis, racks, etc., to your own specifications.—Philpott's Metalworks, Ltd., Chapman Street, Loughborough. (A 352)

WELDING WORK WANTED. Large capacity available in all materials and methods. Keen prices and good workmanship. Difficult jobs our speciality. A.I.D. approved.—Conway-Tolhurst Ltd., Airport, Cardiff. (A 325)

AGENCIES

AGENT wanted for Southern and Western England and South Wales by old-established firm manufacturing lighting fittings.—Kirolite Products, Ltd., 107 Southwick Road, Boscombe East, Bournemouth. (A 492)

WANTED

A.C.-D.C. MOTORS, STARTERS, complete change-over installations, etc.—A.A. Electrical Co., Ltd., 67 Rothschild Road, Chiswick Park, W.4. Tel.: Chiswick 6105. (A 11)

WANTED, D.C. and A.C. ball-bearing MOTORS, MOTOR GENERATOR SETS, DYNAMOS and ALTERNATORS.—Full details to Britannia Manufacturing Co., Ltd., 22-26 Britannia Walk, London N.1. (A 7)

WANTED for prompt cash, ferrous and non-ferrous SCRAP; also plant for dismantling. Buyers of secondhand machinery and plant for re-use.—W. and H. Cooper Ltd., 176 Brady Street, Bethnal Green, E.1. (A 1)

WANTED. Large quantity of 4-in. outside diameter TUBES from the dismantling of old Babcock Water-tube boilers. Best prices paid. Prepared to purchase Babcock and Wilcox Water-tube Boilers for dismantling. —Apply, giving full details, to Midland Iron and Hardware Co., Cradley Heath, Staffs. (A 3)

WASTE MERCURY. Cash on delivery or on collection London area. Containers supplied. Also aircraft plugs, platinum contacts and precious and all scrap metals in any form. Forward samples.—Belgrave Buyers (E.T.), 5 Belgrave Gardens, N.W.8. MAI. 7513. (A 9)

WANTED, ROTARY CONVERTORS, any size.—Universal, 221 City Road, London E.C.1. (A 389)

£50,000

Immediate cash available for purchase of New Ball and Roller Bearings, all types. Steel Balls and Rollers. Top prices paid, small quantities accepted.

CLAUDE RYE BEARINGS

895-921 Fulham Road, London, S.W.6

RENown 6174 (20 lines) (A 328p)

FOR SALE

AUCTIONS

E R

By order of the Secretary of State for Air.
AUCTION SALE
For 14 M.U., R.A.F., CARLISLE
No. 7 Site, Blackwood, Longtown, 9 miles north of Carlisle.

THURSDAY, AUGUST 14, 1952, AT 11 A.M.

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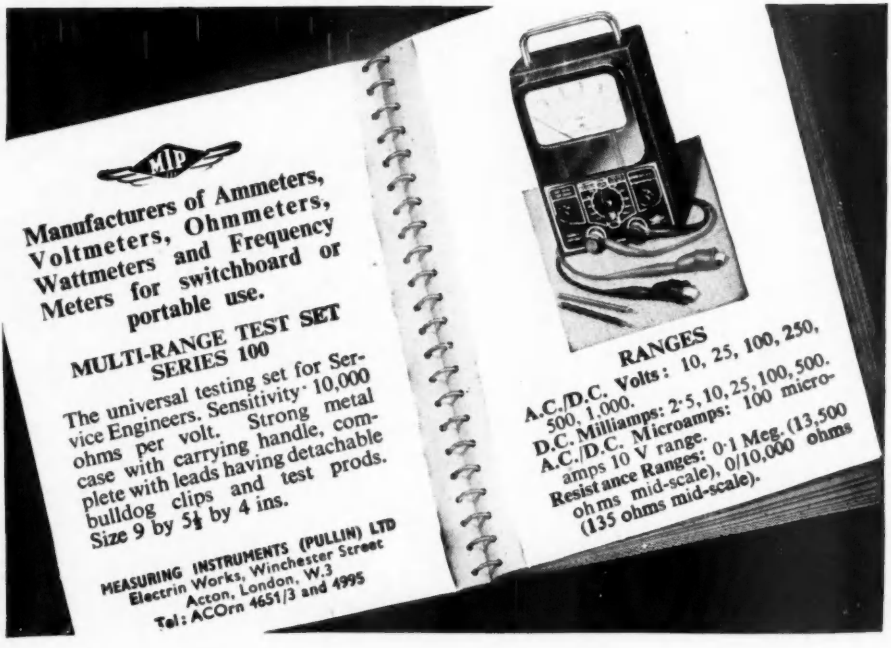
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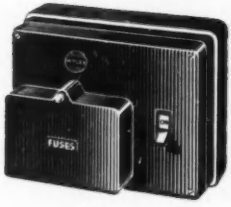

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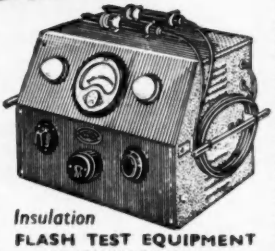

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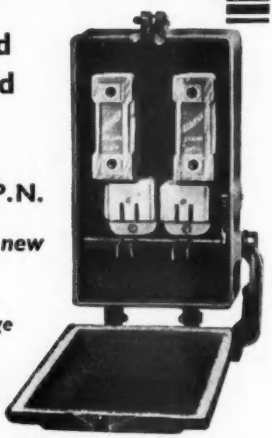

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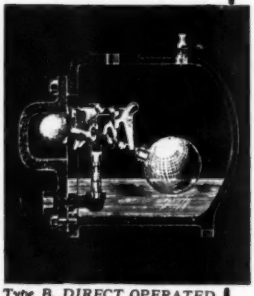

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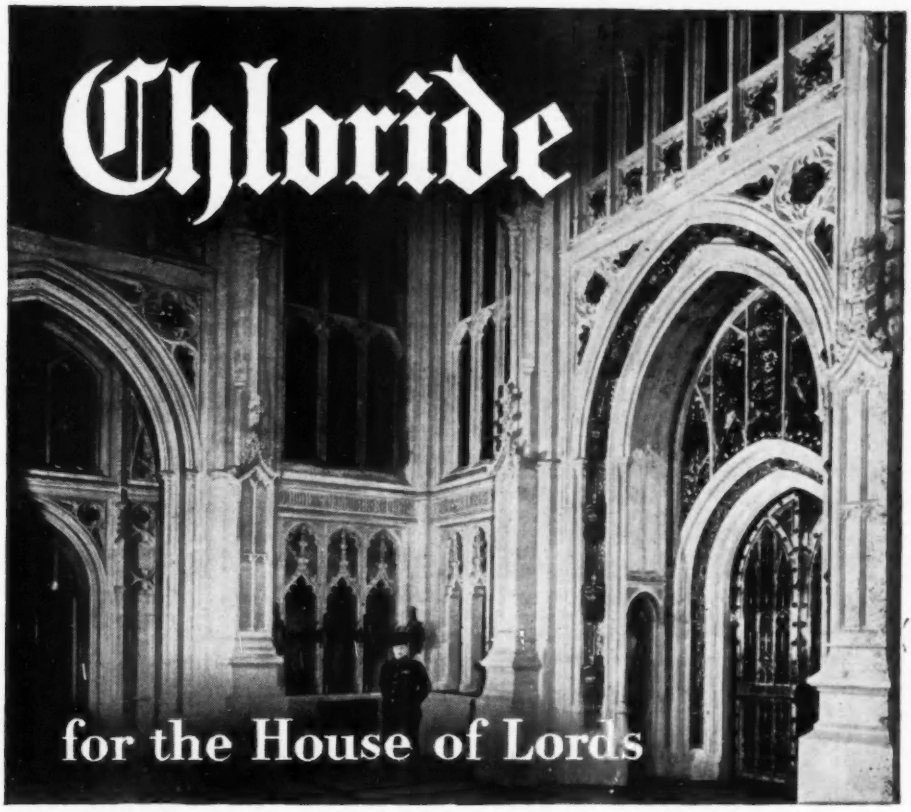

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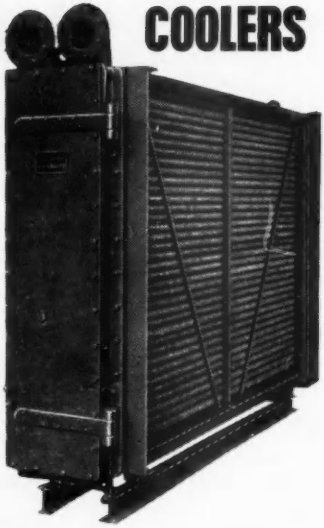

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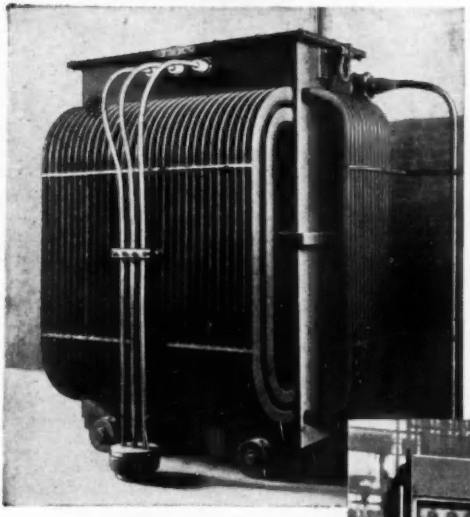

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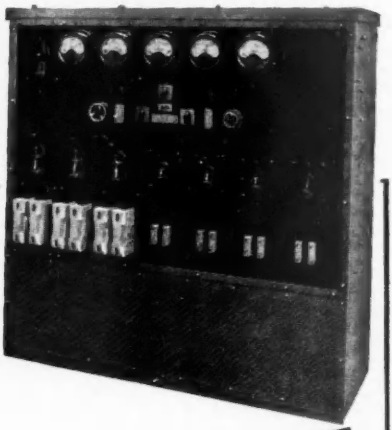

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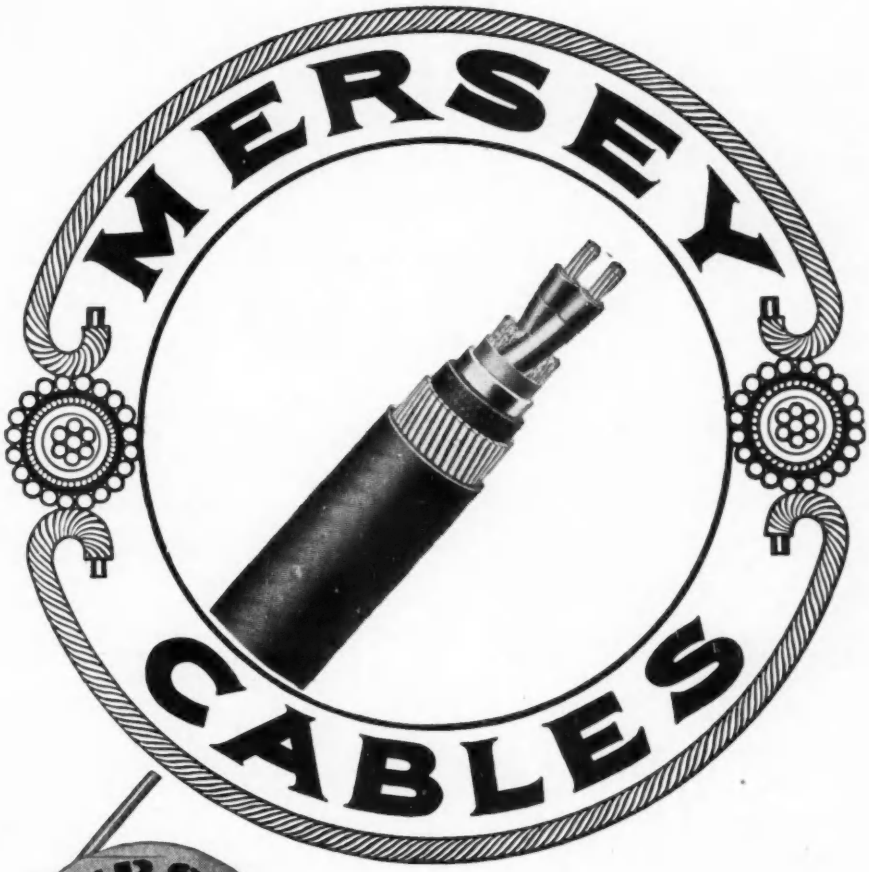

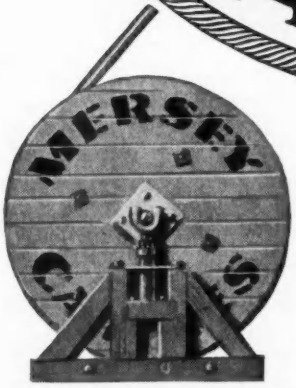

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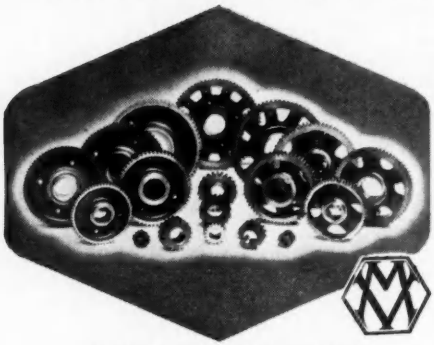

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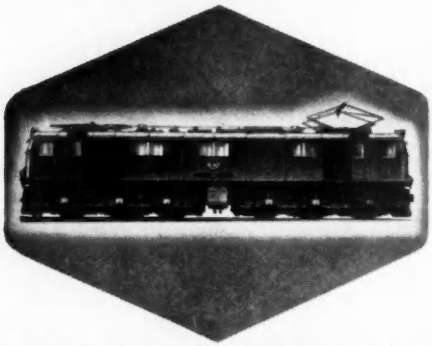

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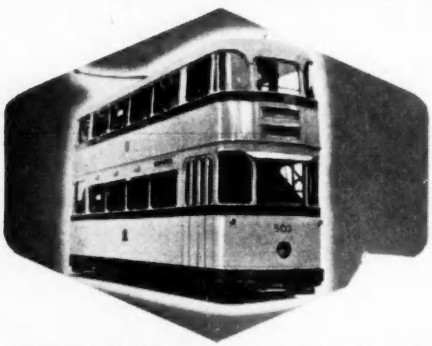

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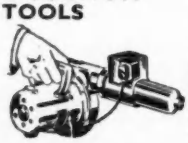

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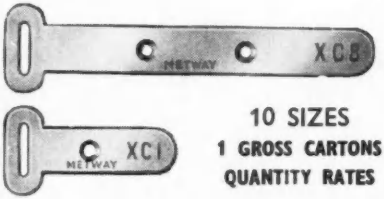

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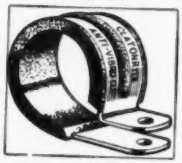

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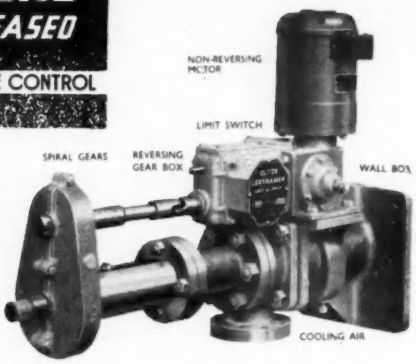

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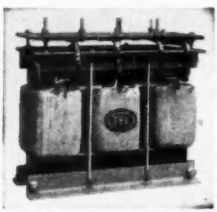

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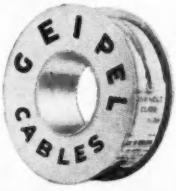

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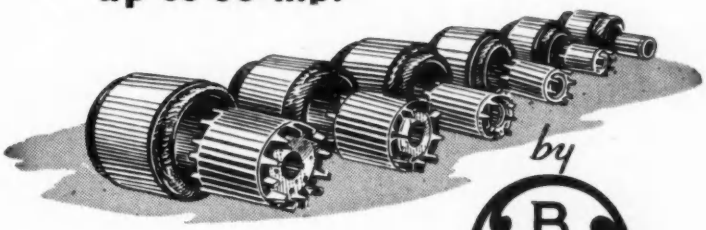

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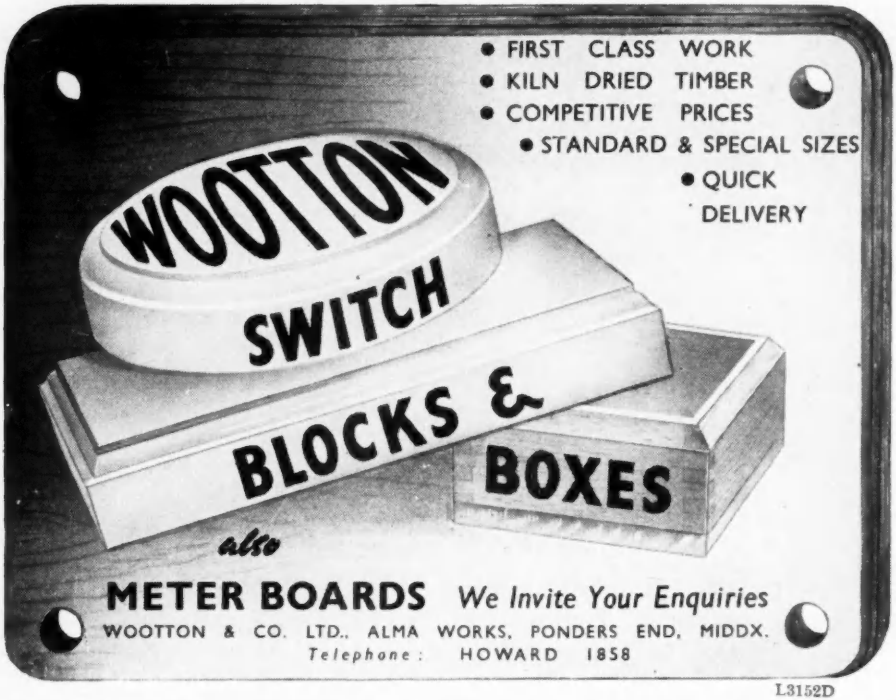

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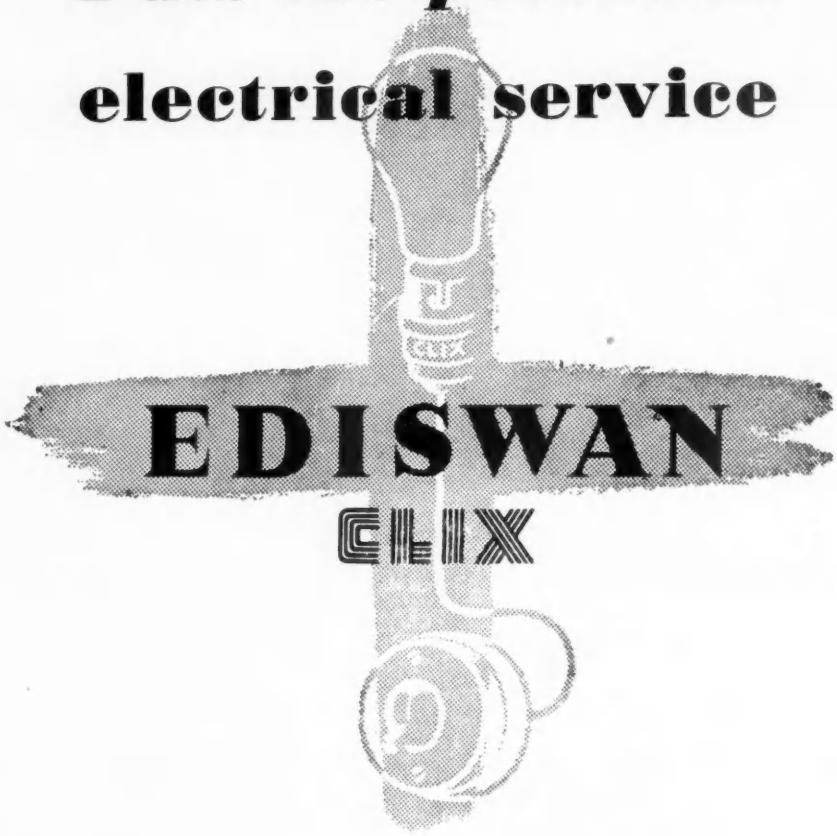

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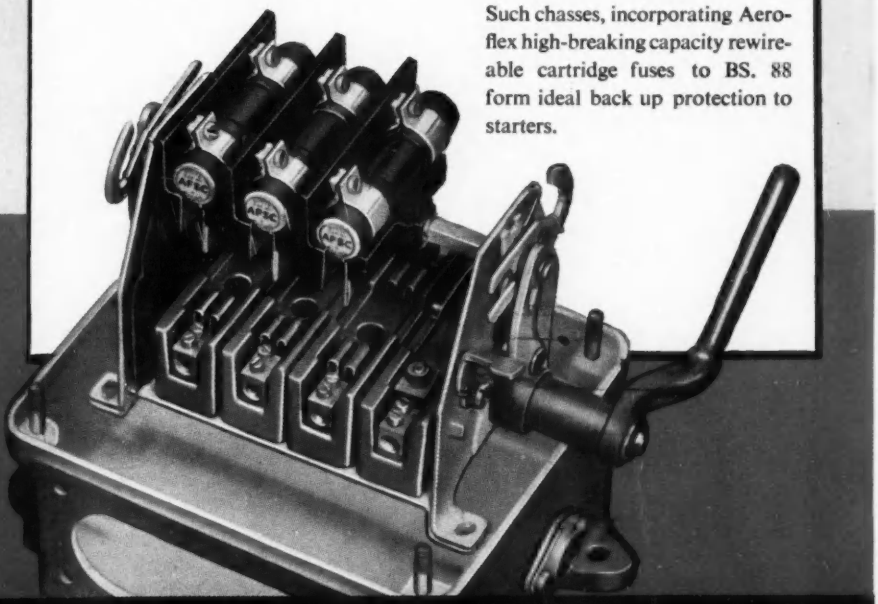

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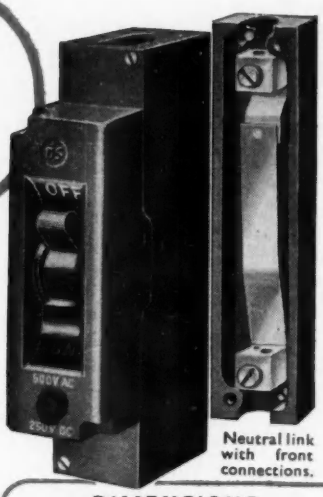

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